

Knowledge Trip to Japan

Introduction: The purpose of this report is to provide a comprehensive overview of the 7-day international visit to various paper industries in Japan conducted by Indian Pulp & Paper Technical Association (IPPTA) in collaboration with Technical Association of the Pulp and Paper Industry (TAPPI). The visit aimed to gain insights into the latest technologies, best practices, and innovations within the Japanese paper manufacturing sector.

Itinerary

1.) Day 1(4thMarch'24):

1.1) Visit to Ichikawa Company Ltd.

President - Mr. Takanobu Yazaki

Founded: 1949; Head Office: Tokyo

Listed on Tokyo Stock Exchange, 1st Section.

Manufacturing Sites: Kashiwa Mill & Iwama Mill (Total area: 90754 M2)

Total Number of Employees: 687

In the first half of 4th March, we visited Ichikawa Company Ltd founded in 1949 with Head Office in Tokyo. Ichikawa is one of the pioneer companies in manufacturing of paper making felts, industrial felts shoe press belts and transfer belts. Ichikawa is engaged in giving a comprehensive solution for the press section. Ichikawa firmly believes in environmentally friendly production processes by saving energy with its unique technology for press section, Ichikawa is proud to support the sustainable development in paper industry.



*Kashiwa Mill (Opened in 1964)
– Needling & Finishing*



*Iwama Mill (Opened in 1996)
– Weaving, Shoe Press Belt, R&D Centre*

Main Products: Industrial felt, Paper Making Felt, Shoe Press Belt, Transfer Belt

ISO 14001, 9001

Greenhouse gas (CO₂) emissions: 4370 T

Since the beginning, Ichikawa has been manufacturing paper making felts and industrial felts. Ichikawa later ventured into the production of shoe press belts and transfer belts. Thanks to the sustained efforts for product development using expertise at our dedicated R&D centre, Ichikawa has gained the reputation as highly sophisticated company in global paper industry. The role of paper making felts, shoe press belts and transfer belts have become more critical in the paper industry. Mills expect advanced products with superior quality, giving highest life with excellent paper & board quality. Ichikawa is engaged in giving a comprehensive solution for the press section. Ichikawa firmly believes in environmentally friendly production processes by saving energy. With its unique technology for press section, Ichikawa is proud to support the sustainable development in paper industry. With just 2 shoe presses in early 2000, India presently has 39 shoe presses in operation, and 7 more waiting to start within next 12 months. Thanks to our representative Omicron Paptech LLP, Ichikawa is proud to be associated with almost all the mills in India which have shoe press. Ichikawa also thank mills in India for their trust in our products and services.

1.2) Visit to Rengo Co., Ltd. Yashio Mill

In second half we visited Rengo Co., Ltd. Yashio Mill, it is the largest paper mill of Japan producing 10 lacs paper annually. Further we explored the following:

- Advanced production technologies.
- Quality control measures
- Engaged in discussions with plant managers/management.

Rengo paper mill management believes in the principle of Safety first, Quality second and then Production. Company maintains an exceptional standard of cleanliness that reflects its commitment to creating a professional and welcoming environment. From well-organized workspaces to spotless common areas, the dedication to cleanliness is evident throughout the premises. If all things considered, the company's attention on cleanliness not only improves the visual appeal of its facilities but also highlights its commitment to operational excellence creating a positive atmosphere for both employees and visitors. Rengo paper mill places a paramount emphasis on energy efficiency, with a notable initiative being the installation of a shoe press technology. This advanced system is strategically implemented to optimize energy consumption and enhance overall operational efficiency.

Achieving a net-zero carbon emissions by 2050 is the aim being taken by Rengo paper mill so they can achieve their dream of environmental sustainability with long term growth.

The Yashio Mill employs an integrated manufacturing system that controls all processes of paper making.

Over 98% of the raw material used to produce paperboard at the mill is recovered paper, including old, corrugated containers.

Yashio Mill constantly strive to develop high quality products that can be reliably used by our customers, while at the same time promoting line automation and mechanization from the viewpoint of productivity improvement and environmental maintenance as well as thorough quality control.

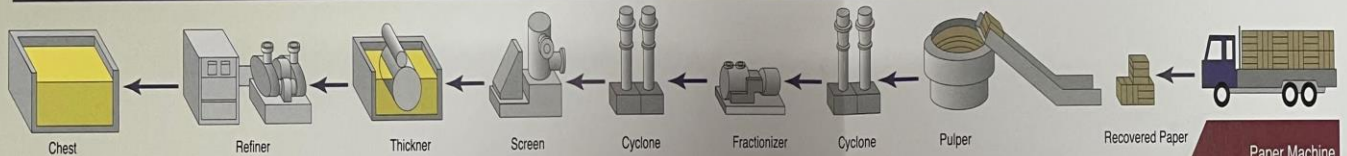
They are putting every effort into creating comfortable plant environments that are easy to work in.

Manufacturing Process

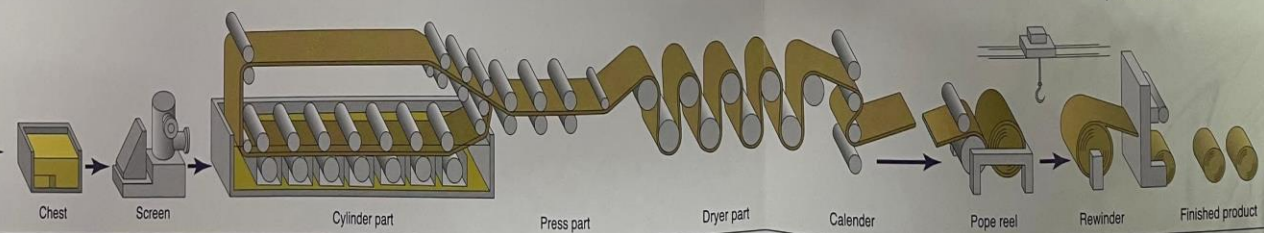
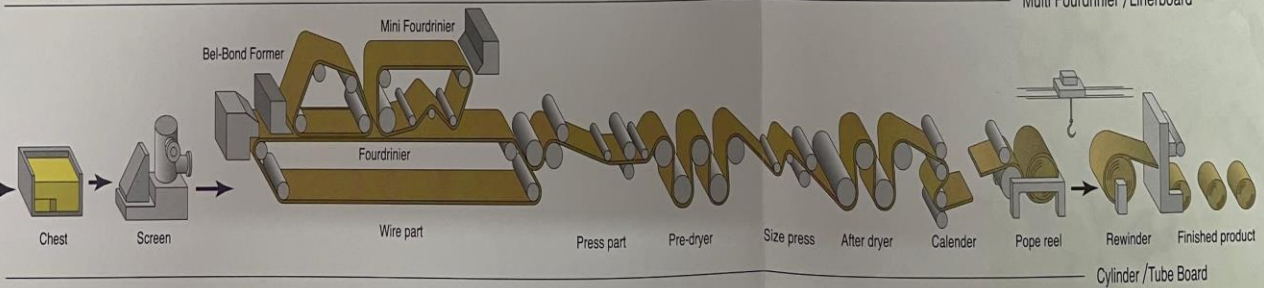
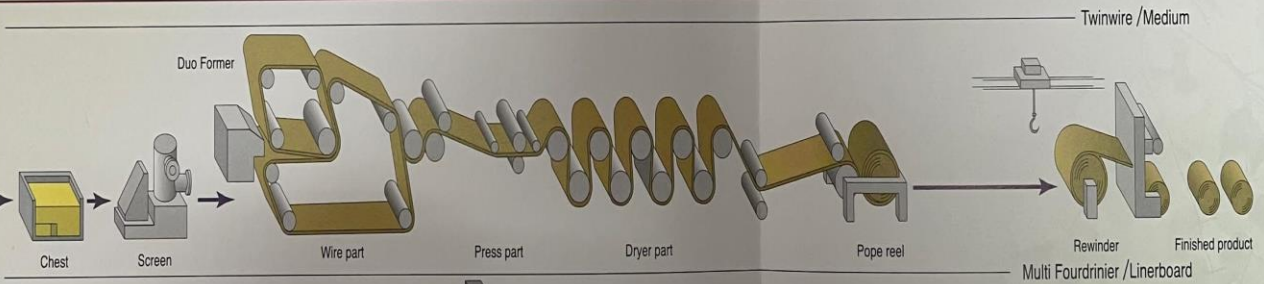
Manufacturing Process Flow Diagram Rengo Co., Ltd. Yashio Mill

Manufacturing Process Flow Diagram

Stock Preparation



Paper Machine



An outline of the Rengo Co., Ltd. Yashio Mill



Mill :	Rengo Co., Ltd. Yashio Mill
Site Area :	130,000 m2
Number of Employees :	228
Main Product:	Liner, Corrugating Medium, Chipboard, Tubeboard
Pulp Manufacturing (Production Capacity):	Recycled Pulp
Paper Machine (Wire width, Production capacity):	#1 PM: 6,650 mm 1,100 t/d #2 PM: 2,400 mm 85 t/d #3 PM: 1,930 mm 70 t/d #5 PM: 5,240 mm 1,000 t/d #7 PM: 7,830 mm 1,100 t/d Total: 3,355 t/d
Boiler (Fuel, Furnace type and Fluidized Steam Generation Capacity)	Biomass fuel Circulating Fluidized Bed Boiler: 70 t/h Biomass fuel Stoker-type Boiler: 24 t/h Gas fuel Boiler: 190 t/h
Power Plant (Generation capacity) :	Total: 62 MW

Rengo Co., Ltd. Yashio Mill Product Portfolio

- Corrugated Packaging
- Clipboard Products
- Tube Board Products



2.) Day 2(5thMarch'24):

2.1) Visit to Oji Materia Co. Ltd., Fuji Mill.

On our second day of the Japan Knowledge Trip, we went to Oji Materia Co. Ltd. Fuji Mill more over OJI group own 11 units around Japan. The unit we visited contain two paper machine PM#1 & PM#2. Got the incredible opportunity to witness paper machine 2 in action during Oji mill visit. Paper Machine 2 (PM2) specialized in the production of corrugated medium and coated whiteboard. The facility operates at 800 meters per minute, with a width of 4700mm, a capacity of 750 tons per day, handling a range of 180-650 GSM across its 5 layers. Notably, the machine features two coaters, tandem press suction, and shoe, while maintaining a fully air-controlled machine hall. The power boiler primarily relies on biofuel, with wood chips, reused plastic, and coal as the main sources. The composition includes 45% wood chips, 40% reused plastic, and the remaining portion consisting of coal. A dedicated biofuel boiler incinerates waste paper and segregated plastic to generate steam. Notably, the reused plastic is sourced from Japan. The entire plant, from Rewinder to ream packing, is automated and equipped with five Pasaban sheeters.

An outline of the Oji Materia Co. Ltd., Fuji Mill.

Mill :	Oji Materia Co. Ltd., Fuji Mill
Site Area :	280,000 m ²
Number of Employees :	160
Main Product:	Corrugating Medium, Coated Board
Pulp Manufacturing (Production Capacity):	Recycled Pulp Deinked Pulp
Paper Machine (Wire width, Production capacity):	N-#1 PM: 4,510 mm 560 t/d N-#2 PM: 4,700 mm 750 t/d Total: 1,310 t/d
Coating Machine :	N-#2 on-Machine Coater
Boiler (Fuel, Furnace type and Fluidized Steam Generation Capacity)	Oil fuel Boilers: 180 t/h RPF* and Biomas fuel, Circulating Fluidized Bed, Boiler: 230 t/h, * Refuse derived Paper and Plastics Fuel
Power Plant (Generation capacity) :	Total: 110 MW

2.2) Visit to Nippon Paper Crecia Co., Ltd. Koyo Mill.

In the latter part of the day, we had the opportunity to visit Nippon Paper Mill, a facility specializing in the production of tissue paper with a weight range of 15.5 to 25 GSM. The Koyo unit achieves a total output of 100 Tons Per Day (TPD). The operational parameters include a power consumption of 350 KWh per ton, 5 tons of steam consumption per ton of paper, and a water consumption rate of 20 m³ per ton of paper.

The process maintains a creeping ratio of 20+/- 5%, while the machine hall is effectively air-controlled, featuring a roof constructed with Reinforced Cement Concrete (RCC). The transportation of jumbo rolls from the machine hall to the Rewinder hall is facilitated by rail electric trolleys.

The machine itself incorporates forming rolls and suction rolls with pneumatic loading. The MG is sourced from Andritz, and the machine is a Belloit make. Additionally, there are four Rewinder dedicated to converting reels, encompassing the entire process from log roll manufacturing to the final packing stage.

An outline of the Nippon Paper Crecia Co., Ltd. Koyo Mill.



Mill :	Nippon Paper Crecia Co., Ltd. Koyo Mill
Site Area :	138,000 m2
Number of Employees :	175
Main Product:	Toilet Tissue, Coated Board, Castcoated paper, Nonwoven
Pulp Manufacturing (Production Capacity):	Recycled Pulp
Paper Machine (Wire width, Production capacity):	F1 PM: 3,360mm 100 t/d #1 PM: 2,060 mm 40 t/d FN PM: 2,032mm 30 t/d Total: 170 t/d
Coating Machine :	#1 PM on-Machine Coater #2 Off-Machine coater #2 off-Machine Castcoater
Boiler (Fuel, Furnace type and Fluidized Steam Generation Capacity)	Gas fuel Combined Heat and Power systems: 17 t/h Gas fuel Boilers: 20 t/h
Power Plant (Generation capacity) :	Total: 6.6 MW

3.) Day 3 (6th March'24):

3.1) Visit to Hokuetsu Corporation Nigata Mill

Hokuetsu Corporation Group initiated the “Medium-term Management Plan 2026” from April 2023 based on the Long-term Management Vision “Vision 2030,” which aims for sustainable growth. With this Plan, Hokuetsu Corporation had set numerical targets, including consolidated net sales of ¥330 billion, and promote business activities toward further enhancing our corporate value in accordance with three basic policies:

- Shift business portfolio.
- Strengthen competitiveness.
- Promote sustainability (ESG) activities.

Group have aggressively shifted its portfolio from its 100th anniversary in 2007 and entered the commercial pulp business in Canada and the white paperboard business in China. Hokuetsu Corporation Group also started a containerboard base paper business in Japan. In addition, company hold 24.8% of the shares in Daio Paper Corporation, a major household paper manufacturer.

The Group formulated “**Hokuetsu Group ZERO CO2 2050**” in 2020 and is pursuing the further strengthening of its environmental competitiveness in order to achieve net-zero CO2 emissions by 2050. Over the three-year period of the new medium-term management plan, we are moving ahead with further reducing group-wide CO2 emissions through the promotion of green transformation and preserving biodiversity by cultivating and managing company-owned forests.

An outline of the Hokuetsu Corporation Niigata Mill



EF

Mill :	Hokuetsu Corporation Niigata Mill
Site Area :	617,000 m2
Number of Employees :	510
Main Product:	Uncoated Fine Paper, Coated Paper, Lightweight Coated, Paper, Coated Board, Corrugating Medium
Pulp Manufacturing (Production Capacity):	Hard wood Bleached, Kraft Pulp #1: 680 t/d, #2: 1,870 t/d, Recycled Pulp, Deinked Pulp
Paper Machine (Wire width, Production capacity):	#3 PM: 3,800 mm 170 t/d #4 PM: 2,900 mm 160 t/d #5 PM: 6,250 mm 460 t/d #6 PM: 5,890 mm 350 t/d #7 PM: 5,880 mm 510 t/d #8 PM: 8,050 mm 980 t/d #9 PM: 10,700 mm 1,080 t/d Total: 3,710 t/d
Coating Machine :	#4 on-Machine Coater #7 on-Machine Coater #8 on-Machine Coater #9 on-Machine Coater

Boiler (Fuel, Furnace type and Fluidized Steam Generation Capacity)	#3 Biomass fuel Circulating Fluidized Bed Boiler: 70 t/h #7 Recovery Boiler: 310 t/d #8 Recovery Boiler: 475 t/d #2 Gas Turbine*: 84 t/h * Combined Heat and Power system
Power Plant (Generation capacity) :	Total: 216 MW

4.) Day 4(7thMarch'24):

Technical Association of the Pulp and Paper Industry (TAPPI) Meet

4.1) Message from Masatoshi Kaku

On behalf of the Japan Paper Association, Chairman Masatoshi Kaku expressed delight in addressing the technical exchange meeting with the Indian Pulp and Paper Technical Association. He extended a warm welcome to the distinguished members of the Indian association, expressing respect for the collaborative efforts in organizing this event.

The message emphasizes the global significance of paper and paperboard products, acknowledging their diverse functions. He discussed the evolving demand landscape, with a shift from paper to digital media impacting graphic paper demand in various countries.

Masatoshi also highlighted India's impressive growth in paper and paperboard production, surpassing Japan to become the third-largest producer globally. Despite challenges faced by the Japanese paper industry, the message details efforts to adapt, restructure, and develop new materials derived from wood.

Masatoshi also emphasized Japan's declining paper consumption, particularly in graphic paper, attributing it to the rise of electronic media. Challenges and changes in demand are discussed, emphasizing the need for measures to prevent further downsizing of production.

He concluded his message with a call for enhanced value creation through sustainable development, expressing aspirations for cooperation with the Indian Pulp and Paper Technical Association to overcome future challenges. The speaker wishes for a deep understanding of Japan's pulp and paper industry through mill tours and the technical exchange meeting, along with an invitation to enjoy the beauty of Japan in spring.

4.2) Message from Kazumori Fukushima, the President of Japan TAPPI

Kazumori Fukushima, the President of Japan TAPPI, warmly welcomed the executives of the Indian Pulp and Paper Technical Association and related companies. He highlighted the collaborative efforts between Japan Paper Association and Japan TAPPI, representing the industry from management and technological perspectives. He addressed the fact that they received the first request of IPPTA visit to Japan in late April last year, and it took about 10 months to become a reality. In his message Kazumori Fukushima explain about the Japan Paper Association, whose chairman, Mr. Masatoshi Kaku.

The Japan Paper Association is an organization whose members include major pulp and paper manufacturing companies. Japan Paper Association play the role of representing the industry from a management perspective, including determining industry policy, public relations activeness, and compiling various statistical figures.

On the other hand, the Japan TAPPI is an organization whose members include major pulp and paper manufacturing companies and related companies, and individual engineers. TAPPI also an academic research organization. TAPPI play the role of representing the industry in terms of a technology perspective, publish the Japan TAPPI Journal and hold seminars and research conference.

According to Japanese pulp and paper industry last year, Japan's GDP in 2023 was surpassed by Germany and ranked fourth. This is partly due to the weak yen, but it is also true that GDP of Japan has barely grown over the past 30 years.

In contrast, India's GDP has been growing at around 7% per year, except in 2020 during the COVID-19 pandemic, and there are predictions that India will become the third world's largest economy in the next three years. In Japan, demand for paper and paperboard was in the 30-million-ton range until 2008, but has continued to decline since then. Japan's pulp and paper industry is in the midst of structural transformation in response to declining the domestic demand and efforts to achieve carbon neutrality in 2050. As part of the response to the decline in the domestic demand, TAPPI have great expectations for the growth of Indian market such as cardboard, packaging materials, and paper cartons, since some Japanese companies are expanding into India in the business of cardboard, packaging materials, and paper cartons.

I heard that you visited China in 2016 and South Korea in 2018 as part of your overseas observation and technical exchange tours like this time.

5.) Take away from Knowledge trip:

A. During our IPPTA knowledge trip to Japan, we observed a comprehensive approach to paper production emphasizing on

- **Technological advancements**
- **Sustainability**

The focus on wood pulp brightness reaching 85%, highlighted the commitment to high-quality paper. The technological upgrade of machines stood out as a prime feature, ensuring sustainable operations and consistent results.

B. Implementing

- **High 5S activities**
- **Maintaining cleanliness**
- **Discipline**
- **Adherence to SOPs**

Combined with the focused involvement of managers, reflected a cultural development emphasizing honesty, idea generation, and continuous improvement. Moreover, the strategic move to reduce manpower through automation and utilize artificial intelligence, as exemplified the use of refiner °SR with energy-saving measures, showcased a forward-thinking approach.

C. Energy saving emerged as a top priority, evident in the installation of a shoe press with the objective of reducing energy consumption. The significance of a triple calendar machine highlighted the importance of achieving smooth paper. Safety during production duties remained a paramount concern.

D. The integration of a tissue machine with back-to-back facilities for toilet tissue conversion, equipped with three rewinders and four lines of production, demonstrated a forward-looking strategy.

Despite the high tissue consumption in Europe due to climate change, the observation suggested that India might take time to develop tissue culture and meet demand. However, moderate demand growth in the medium term is anticipated. The overall demand growth for packaging-grade paper indicated a reduction in graphic paper demand, aligning with evolving trends in the paper industry.

- E. The utilization of wood chips and plastic waste as fuel in boilers reflected a commitment to sustainable practices, with minimal coal consumption for power generation. The emphasis on carbon neutrality in Japan, evident in all mills, underscored the dedication to reducing carbon emissions.

Wood chips processing and transfer to wood pulp mills via truck tippler showcased an efficient logistical approach. The critical analysis of labour replacement, recognizing the long-term perspective and the need for manpower reduction, provided insights into balancing cost considerations and efficiency.

Moreover, comparison of manpower levels between Japan and Indian mill operations highlighted the distinct labour dynamics.

Lastly, the meticulous quality inspection of pallets, involving dust removal and tactile inspection for abnormalities, emphasized a commitment to maintaining high standards throughout the production process. Overall, the Japan IPPTA knowledge trip revealed a holistic and forward-thinking approach to paper production, incorporating technological advancements, sustainability measures, and a strong focus on quality and safety.

- F. Japan have great yellow line and white line culture throughout the entire mill ensures a meticulous approach to safety and cleanliness. Effective hall ventilation is paramount, especially in machine halls with flat ceilings and no A-type roofs. The objective is to prevent any water accumulation on the machine floor, particularly crucial when the outside temperature falls below 5°C. Energy-saving measures should be explored and evaluated for study, with a focus on minimizing consumption while preserving efficient operations.
- G. Despite an observed sulfidity of 28%, no odour was identified in the mill area, indicating a need for further assessment and potential optimization. The combustion of NCG gases in the recovery boiler raises environmental and efficiency considerations, warranting a comprehensive review of alternatives and potential improvements for reducing carbon emission.

In conclusion, a holistic approach encompassing HVAC optimization, energy efficiency, and strategic material choices is essential for ensuring a sustainable and cost-effective operation in the mill, fostering a balance between environmental consciousness and economic viability.
