

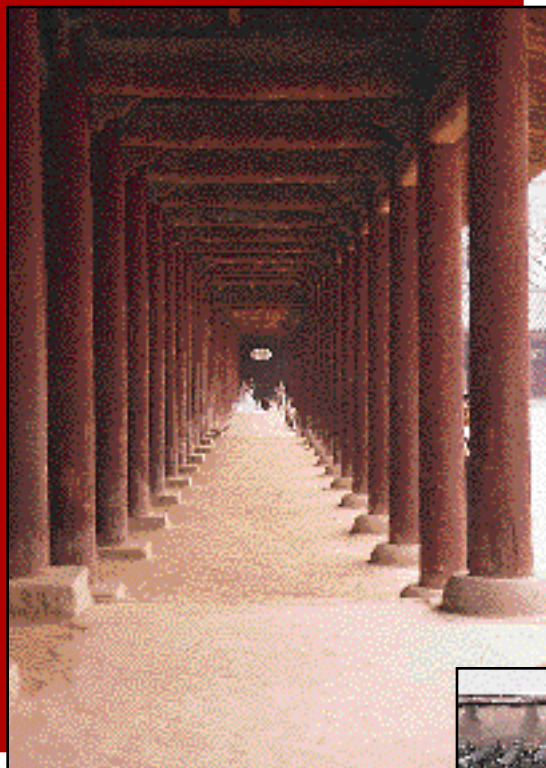
INDUSTRY FLOURISHES in

ASIA'S

“LAND of

..... the MORNING

CALM”



▲ Seoul's Kyongbok Palace

◀ Bridal photo sessions

BY DONALD G. MEADOWS

South Korea's pulp and paper industry hosts TAPPI study group.

To see the countryside of Korea is like visiting the set of M*A*S*H. Rugged hills and mountains mat the landscape near the border of North and South Korea, replaced by worn hillocks and finally coastal plains the further south and west you travel. The Taebaek-

Sanmaek Mountains form a spine that curves along the eastern coast, bordering the Sea of Japan.

Seoul, the capital of South Korea, is a modern, bustling city of 11 million people situated barely 40 km (25 miles) south of the DMZ. It is one of the largest metropolitan areas in the



▲ The study group outside the National Museum in Seoul.



◀ Inside Seoul's Lotte department store.



▲ Making kimchi (photo by Pauline Kinstrey)

world and was the first official stop of TAPPI's Asia Study Tour. Beginning Nov. 26, 1994, the tour included visits in Korea, Taiwan, and Indonesia, with stops in Singapore and Thailand.

This was the third international study tour organized by TAPPI since 1991. Previous tours have served to strengthen ties in Russia and Eastern Europe and in South America. The basic goals for this trip were similar to those of the previous study tours:

- To view firsthand developments and trends in the pulp and paper industry in Asia and report those activities and relevant observations in a series of articles in *Tappi Journal*
- To meet with the leaders of sister associations in the countries visited
- To identify potential activities in which TAPPI can play a constructive role, in cooperation with its sister associations in the region

Tour participants included Ronald B. Estridge, Jack E. Chinn, Robert B. Kinstrey, Wells E. Nutt, Brian W. Attwood, and their spouses. The group also included Bo Fahlin, Hou Min Chang, Kunio Hata, Wayne H. Gross, and *Tappi Journal*

¹At the time, Estridge was TAPPI president, Chinn was vice president, and Fahlin was on the Board of Directors and chairman of the International Committee; Kinstrey, Nutt, and Landegger were continuing terms on the Board of Directors. Attwood had recently been elected to the Board of Directors and, along with Hou Min Chang, served on the Board's International Committee. Hata represented Japan TAPPI. Gross, as TAPPI's director of international operations, organized the tour.

Editor Donald G. Meadows. Christian Sauzedda, who represents Black Clawson in Asia, joined the tour in Indonesia on behalf of Carl C. Landegger (who serves on TAPPI's Board of Directors and International Committee).¹

As part of this series of articles on Asia, reports on the pulp and paper industry in Japan appeared in last month's *Tappi Journal* (April 1995, p. 63). Reports on the visits to Korea and Taiwan appear in this issue, to be followed next month by reports on Indonesia and Southeast Asia. The series ends in July with a brief look at China.

Culture

Before the first formal meetings, study tour participants had part of a weekend to adjust to the time change and learn a little about Korea and its culture. Stops in and around Seoul included visits to Kyongbokkung Palace, the National Museum of Korea, the National Folk Museum, and Chogyesa Temple.

The peninsula as a whole has served as a bridge between China and Japan for centuries. As a consequence, the Koreans have at different periods been invaded by their two neighbors. Japan annexed Korea in 1910 and ruled there until the close of World War II. The continuing political division between North and South Korea dates from the Allied occupation of the peninsula by Soviet forces in the north and U.S. troops in the south. The Korean War of 1950–1953 failed to reunite the country but succeeded in devastating the land and leaving much of the population homeless.

*Donghae's
woodyard at Ulsan* ▶



Downtown Seoul ▲



Korean folk dancers ▲
(photo by Pauline Kinstrey)

As has been the case with Germany, Japan, Singapore, and other countries ravaged by those conflicts at midcentury, South Korea has rebuilt and prospered.

The Lotte department store in downtown Seoul is a well-stocked example of the range of high-quality merchandise available to Koreans. It's also an interesting place to visit when it first opens in the morning. Customers are welcomed by martial music playing over the speakers and three or four white-gloved, similarly dressed young attendants standing at attention at each sales area of the building.

Korean pulp and paper industries

After China, Korea was one of the first countries to develop the art of papermaking. It was a Korean who then carried the knowledge to Japan in A.D. 605. Things have progressed a lot since then (see Fig. 1).

Korea's paper manufacturers started 1994 with a combined capacity of 6,351,000 metric tons—nearly three times what it was 10 years earlier. Because of the worldwide market slump, however, actual production for 1993 was 5,804,000 metric tons. Of all grades, newsprint production has grown the most, reaching 767,000 metric tons capacity by the end of 1993. Even so, the dominant grade produced in Korea is paperboard (3,234,000 metric tons), followed by printing and writing papers (1,486,000 metric tons). The growth in capacity is illustrated in Fig. 2.

A formal breakfast gave the TAPPI delegates a chance to meet with the top leadership of the Korean pulp and paper industry including more than two dozen representatives of the

Korea Paper Manufacturers' Association (KPMA), Korea TAPPI, and the Korea Paper Industry Cooperative.

During the meeting, Choi Byung-Myun, CEO of Donghae Pulp Co., noted that Korea is highly dependent on overseas supplies for pulp (see Fig. 3). Just under 69% of the pulp used in Korea during 1993 was produced from recovered paper. The actual domestic recovery rate was 46.3% in 1993, about 2.7 million metric tons. KPMA estimates the rate will reach 50% this year and climb to 52.7% in 1998. Throughout the tour, the TAPPI representatives saw huge storage areas of old newsprint and reclaimed paper that gave evidence of the dependence on recycling fiber (see Fig. 4).

Hansol Paper—largest company, fastest PM

As part of the tour, the study group visited Hansol Paper's Chonju mill. The mill's PM 6 is said to be the fastest newsprint machine in the world. According to Valmet, the company that built it, the paper machine has a wire width of 8.7 m, a design speed of 1500 m/min, and a daily production capacity of 720 metric tons. The machine uses furnish consisting of 80% deinked pulp. Valmet also supplied ventilation systems, a runnability and condition monitoring system, and a machine automation system as part of the installation.

Not only was PM 6 built in record time, but its startup speed of 1161 m/min was also a record; two months later it was operating at 1300 m/min and was at 1405 m/min last fall. The drawback is that the high speed is seen as the main cause of an average 1.5–2 breaks per day on the machine.



◀ Donghae's Ulsan pulp mill

▼ Krafting timbers for use at Chogye-sa Temple



The new machine boosts total capacity for the mill to about 820,000 tons/year. That makes Chonju the fourth-largest single newsprint mill in the world, according to Hansol. With the addition of yet another newsprint machine in 1996, it will be the third-largest mill in the world, with capacity exceeding 1 million tons/year.

Before the startup of PM 6, there was some concern that the new machine might result in an oversupply of newsprint in Korea. Instead, demand increased as newspapers in Korea increased their page counts from 16 pages on up to 48 pages. For now, the country imports about 20% of the newsprint it consumes. That will change with the start of Chonju's PM 7. Two other Korean newsprint producers are also expanding capacity, according to Hansol officials.

PM 7 will have a design speed of about 1700 m/min and will operate at about 1500 m/min, according to Hansol. Capacity will be a little more than 770 tons/day of 43–46-g/m² newsprint.

Chonju began operation in 1968 with a 120 tons/day paper machine. A second machine of half the capacity started up the next year. Three more machines—built by Mitsubishi Heavy Industries of Japan—were added between 1977 and 1989, increasing capacity by 260 tons/day, 400 tons/day, and 550 tons/day respectively. Capacity on each of the machines has since increased. The smaller machines are used to produce uncoated woodfree papers; PM 4 (430 tons/day) and PM 5 (590 tons/day) are both gap formers used to make newsprint.

About two-thirds (2000 tons/day) of the pulp processed at Chonju is deinked pulp. Another 550 tons/day is kraft pulp, 350 tons/day is thermomechanical pulp, and 200 tons/day is groundwood.

The mill added a Measurex MXOpen™ integrated control system to PM 3 in 1993. The package included supervisory

machine-direction control for basis weight, moisture, ash, color, coordinated speed change, dryer shutdown, and dry stock. Cross-direction actuators monitor weight, moisture, and caliber profiles.

Soon afterwards, the company ordered an ABB AccuRay® 1190™ paper machine measurement and control system for PM 6, along with two work stations.

The Chonju mill is also notable for its environmental control efforts. The mill was recognized for exemplary efforts each year from 1988 through 1993. In 1992, the mill installed an oxygen aeration system for waste water treatment. In 1993 it was the first to install a reverse osmosis membrane system for waste water treatment. The membrane system may allow the mill to completely recycle its waste water, once some pretreatment problems have been resolved. Chonju can process up to 100,000 m³ of waste water per day. It reports chemical oxygen demand (COD) levels of 70 kg/ton, biological oxygen demand (BOD) of 25 kg/ton, and suspended solids (SS) of 20 mg/L.

"This is the finest newsprint mill I've ever seen," Estridge told Hansol officials after touring the Chonju mill. He was impressed by the cleanliness, the modern technology, and the tremendous capital investment.

Hansol produces fine paper and high-quality printing paper at its Changhang mill. Production at the mill began toward the end of 1991, with an annual capacity of 160,000 tons/year.

Hansol's Chonju mill ▶

▼
The Taejon mill makes
disposable diapers and
feminine hygiene products



year. Valmet also modernized the wire section of PM 1. Both are 3.4-m machines. The facility has room for two additional paper machines and a second coater.

Hankuk, along with several of Korea's other major paper manufacturers, are part owners of the Donghae Pulp mill, which is located near to the Onsan paper mill.

Production of duplex board at the Taejeon mill begins this year.

Hankuk's Onsan mill

The tour also included a visit to Hankuk Paper Manufacturing Co.'s Onsan mill, located near Ulsan in the southeast corner of the peninsula. Anyang, the first of the company's mills, is located just outside the southern confines of Seoul. It began producing printing and writing paper in 1960. Its three paper machines have a combined capacity of 100,000 tons/year of fine paper. The company also runs a carton pack facility—the Panwol mill—in nearby Ansan as a subsidiary.

The Onsan mill began producing printing and writing paper in the summer of 1989 with a Valmet twin-wire former. PM 1 can run at 900 m/min and has the capacity to produce 100,000 tons of paper per year. A high dew point enclosed hood installed on the machine serves to conserve energy, retain heat, and aid water circulation.

In 1993, the mill added a four-head, off-machine blade coater built by IHI of Japan. The double-coater is operated through an online control system. The system controls and monitors coating weight and gloss, basis weight, moisture content, and paper thickness.

A second paper machine—a 120,000 tons/year Valmet twin-wire gap former—should begin operation in August of this

Donghae pulp mill

Although Donghae Pulp Co. was established in 1974, it wasn't until late 1980 that commercial operations began with the start of a 300 a.d. tons/day mill at Ulsan. Capacity was increased to 450 a.d. tons/day in 1985. Plans are to increase that by another 50 a.d. tons/day. Startup of a second line in March 1993 increased the company's pulp capacity by 640 a.d. tons/day.

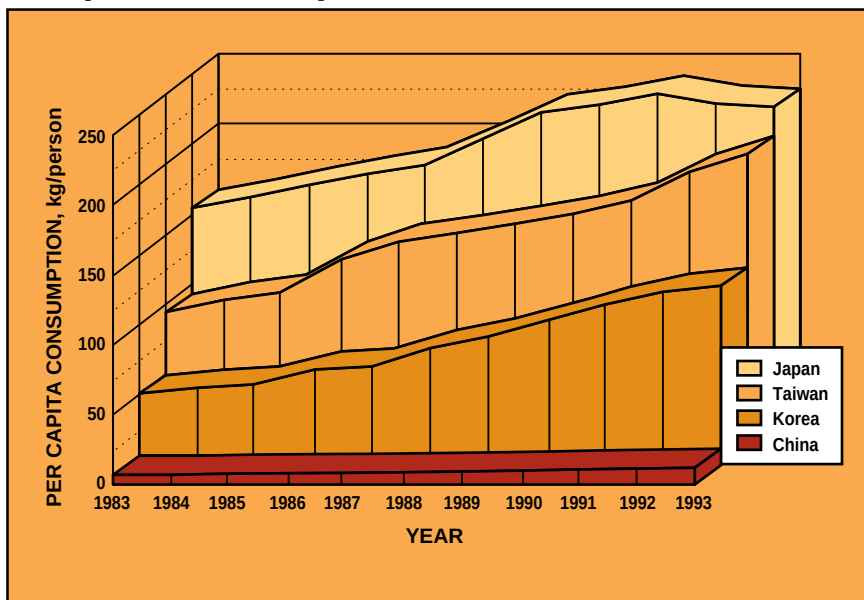
The new line uses a Kamyr continuous digester for cooking and Kamyr diffuser for washing. Ingersoll Rand supplied the pressure screen and bleaching equipment. The line uses an O₂ C/D, E D bleaching sequence. In contrast, the old first line is equipped with a batch digester and uses a C/D, E/O D1 E2 D3 bleaching sequence.

Donghae has the capacity to treat 78,000 tons/day of waste water, using both chemical and biotreatment. With limits of 100 ppm for BOD, COD, and SS, the mill operates at 5 ppm BOD, 50 ppm COD, and 10 ppm SS.

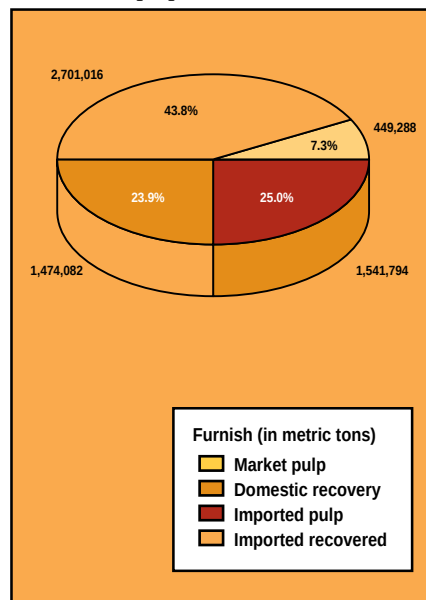
Production hit 380,000 a.d. tons/year for 1994. About 70% of the wood processed by the mill was oak, 30% was eucalypti and beech. Between 70–80% of the wood is imported, mostly from the United States, Chile, Australia, and other Asian countries.

The company is reported to have signed with Valmet to add three paper machines to the facility over roughly six years. The first should be in production by 1997, with a capacity of

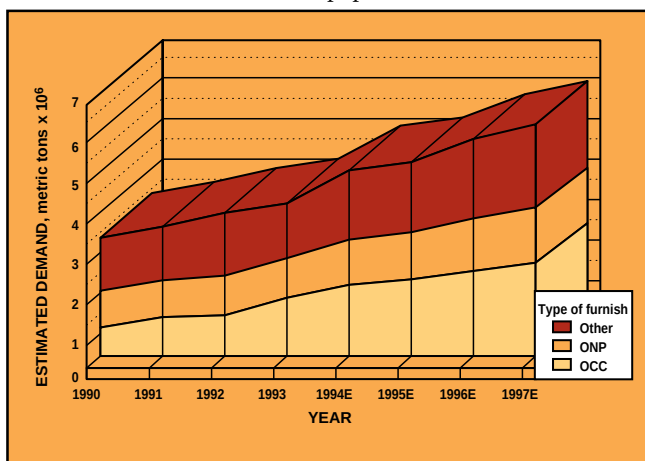
1. Paper and board consumption in N.E. Asia



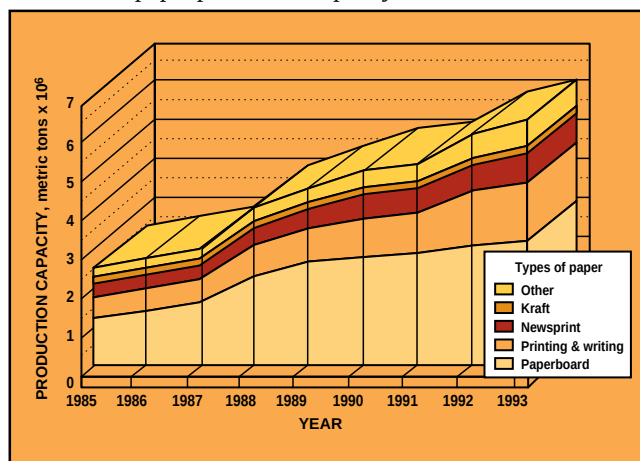
2. Korean pulp sources—1993



3. Korean trends in recovered paper demand



4. Korean paper production capacity



200,000 tons/year. It will probably produce lightweight grades. A second machine will probably be used to make higher grades.

Yuhan-Kimberly Taejon mill

The study group was also honored with a visit to Yuhan-Kimberly's recently opened Taejon mill. Taejon itself is a city of about 1.2 million people, the sixth largest in Korea. It's situated about 130 km (80 miles) south of Seoul. Yuhan-Kimberly's plant is located in an industrial complex. Nearby, Hansol has also been building a tissue plant.

This was the first time the Yuhan-Kimberly mill has been open to visitors. The highly automated facility is designed to manufacture nonwoven products such as disposable diapers, sanitary napkins, and bath tissue. About half of the planned capacity has been installed. A tissue manufacturing area will be added later.

Production of Kotex-brand sanitary napkins follows a U-shaped course, from fluff stage to packaging. The operation is designed to produce 600 pieces per minute, but was being run at 350 pieces per minute. Huggies Ultra-slim diapers were being produced on another line at 500 diapers per minute.

Yuhan-Kimberly now claims a 40% market share for bathroom tissue, 45% for facial tissue, 45% for sanitary napkins, and 50% for disposable diapers. Along with the Taejon facility, Yuhan-Kimberly operates mills in Anyang and Kimcheon.

The company puts great emphasis on high quality, craftsmanship, and productivity—and keeping costs down. The company's focus on hygienic products is reflected in its environmental activities, such as the "Keep Korea Clean Campaign." Starting in 1984, the company also began a campaign to plant trees throughout Korea. A decade later, more than 13 million seedlings had been planted as part of the program. 

Meadows is editor of Tappi Journal