

# A Strong Market for a Delicate Product

A healthy, growing, global tissue market is good news for producers. But making the soft stuff can be a complicated process. — **By Ken Patrick**

**The global tissue industry** continues to be healthy, even in North America where annual consumption has plateaued in recent years at a world high of 23 kg per person and annual capacity has now topped 8 million tons. Several price increases last year and into 2005, especially in the AFH sector, have helped to keep the U.S. industry in generally good condition, although operating rates have lingered in the mid- to high-80s for the past several years.

Operating rates in the U.S., however, are expected to hit and possibly exceed 90% this year and next as demand for tissue remains steady or moderately growing at about 2%, with no major new capacity scheduled to come online at least through 2006. The return to a healthier state in North America comes after a few anemic years during which tissue capacity edged up while demand more or less stagnated in a halting economy.

The current and near-future outlook for tissue producers in Western Europe and Scandinavia is also good, bolstered somewhat by the investment buying strength of the Euro. In Asia—China in particular—as well as Eastern Europe, the outlook is especially rosy. China is currently the world's second largest producer and consumer of tissue, with 2004 production near 3.5 million metric tons, up from around 680,000 metric tons in 1990.

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By comparison, the U.S., operating at around 88% of capacity, produced some 6.5 million metric tons of tissue grades last year. But this primarily fed a saturated 23 kg per-capita domestic demand in the U.S., while China's output mainly targeted a domestic demand of only 2.7 kg/year, which is expected to increase to 3.4 kg by 2010.

Put in perspective, just a 1% increase in demand in China represents several million tons of new capacity and at least 100 new paper machines. A corresponding 1% increase in North America is generally considered stable with little or no market impact one way or the other.

## **Staying Healthy**

Staying healthy is not so easy for all tissue makers in North America, regardless of whether price increases make it to their level or if demand does, in fact, stay ahead of capacity.

For many tissue mills in the U.S., the narrow road to profitability has long been (and will continue to be) a matter of maximizing overall productivity—getting the most from what they have at the least cost possible. In this regard, the tissue sector has something in common with its cousin paper and paperboard producers.

As in all grades, tissue mills in North America have been hit with increasing energy and fiber costs in the past few of years, making profitability even more elusive, especially for the 20% smaller players in the tissue arena. The big three U.S.-based producers—Kimberly-Clark, Georgia-Pacific, and Procter & Gamble, also major players in Europe and elsewhere in the world—currently control some 80% of North America’s tissue markets and 50% in Western Europe.

The fact that any growth in the North American tissue market will be relatively small compared with other regions of the world—especially Asia—makes the profitability problem even more acute. It’s simply difficult to make money in such a small, tight, and highly competitive market where consumers demand higher and higher quality in almost all product grades. Maximum productivity is absolutely essential.

To explore challenges facing most small as well as many larger North American tissue producers today, *PaperAge* recently met with Dr. John Charles, co-founder of PROdry Technology, a tissue consulting company based in Vancouver, Wash., and chairman for the past 11 years of TAPPI’s Tissue Runnability Short Course. Charles was employed by Crown Zellerbach/James River/Fort James/ as research fellow and manager of the corporate technical group responsible for paper machine system analysis, optimization, and diagnostics for the company’s U.S. and European paper mills. His views on what tissue mills need to do to remain competitive and stay profitable are summarized in the following paragraphs.



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— Dr. John Charles, PROdry Technology

## Attention to Detail

Today, the tissue industry’s technology suppliers and equipment manufacturers, as well as many major producers, are investing a great deal of time, money, and attention in China and other parts of Asia, because of the growth potential there, Charles explains. This puts pressure on many North American-based producers, now out of the “spotlight” and possibly not getting as much attention and help from the supplier side as they once were.

To survive in a limited growth market that is not currently the center of world attention, some tissue mills in North America and Europe have to focus their resources on getting “the greatest productivity they can out of the processes they have,” Charles says. “To do that, they need to pay continuous attention to even the smallest of details.”

Tissue making is a very complicated process, he points out, although tissue machines in general may be relatively small. “Things happen rapidly on a machine moving 7,000 fpm. And when the paper being made is only 8–10 lb/3,000 ft<sup>2</sup>, the process becomes very delicate.”

To maximize productivity under these process conditions, mills have to keep the sheet on the reel and produce a product that can be converted with minimum losses. It’s a real balancing act to keep productivity high, wrestle with energy costs, and meet consumer quality demands, and still make money in the small growth markets these mills serve, according to Charles.

Country or Region	U.S.	Western Europe	Eastern Europe	China
Per-Capita Tissue Consumption, kg/yr	23	14	2.2	2.7
Production, projected metric tpy, 2005	6.6	7	3.5	2.2
Growth Rate, projected next five years	1-2%	2-3%	7-8%	8-10%
Operating Tissue Machines	145	105	50 (est)	800-Plus (most less than 5 tpd)

Table 1. Snapshot of U.S and Western European tissue production and demand versus China and Eastern Europe.



Tissue machine operating rates in the U.S. should reach 90% this year and next as demand remains steady or moderately growing at about 2%, with no major new capacity to come online.

In many cases, maximizing productivity and minimizing energy usage are mutually exclusive, he adds. "It's almost always a compromise—one or the other. But there are things—general mechanical conditions—that can get in the way of energy efficiency. By paying close and constant attention to process details, these conditions can be corrected without sacrificing productivity," he notes.

As far as quality goes, recent technology advances include through-air drying (TAD), which improves tissue bulkiness, absorbency, softness, hand feel, etc. But TAD drying systems can be very costly and beyond the capital investment scope of many mills. Thus several process "schemes" have been implemented to mimic TAD quality, Charles says, and some of these have been successful to varying degrees. "But these require that the machine be running really well," he points out.

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## Crepe Blade Hell

An area that can have a dramatic impact on machine runnability-productivity is the Yankee dryer-crepe blade combination, Charles notes. "If the machine's running great and the Yankee dryer is smooth and round with the coating working as it should, then ideally things will run stably and the crepe blade will last a relatively long time.

"But if things are not running so well, a machine can rapidly degenerate into 'crepe blade hell,'" he says, adding that operators generally tend to blame the coating (primarily a release agent and adhesive) for crepe blade problems. Although it is critical, the coating can only do so much, he cautions. "If there is an internal problem with the Yankee dryer's condensate system, the result will be thermal variations, which make it difficult for the coating to set up."

When the coating doesn't set up properly, metal-to-metal contact of the crepe blade and Yankee cylinder can occur. "Once that starts, it can quickly lead to sort of a washboard road phenomenon, with the crepe blade digging in more and more. Before too long, it's not possible to keep the sheet on the reel due to breaks at the crepe blade.

"The machine goes down for a day and a half to three days, depending on what exactly has to be done," Charles says. "Usually, you have to grind the Yankee cylinder back to smoothness and roundness, which results in a progressively thinner shell each time it's done. Eventually, the vessel has to be derated pressure-wise."

When that happens, he continues, a mill is faced with either having production limits based on the ASME pressure codes and running their Yankee in a certain, limiting way, or replacing the dryer, which can have a several million dollar price tag, especially when considering the lost production.

## Overworking the Yankee

In some cases, Yankee dryers can have a dangerous tendency to go out of round, Charles explains. They can wear that way, but a particular phenomenon occurs at some mills attempting to improve softness or increase speed.

One way to make a sheet softer, he says, is to dry it more at the crepe blade, to around 2% or less moisture. This obviously makes the Yankee work harder, which tends to make it distort. The Yankee cylinder can reach a point where it literally buckles, similar to twisting a soft drink can.

“This problem has been bothering the industry for at least a decade now, and it’s still happening with some regularity today. It’s a purely elastic phenomenon, so that the dryer will spring back to its original shape, more or less, without permanent damage.

“But, of course, the sheet has to be taken off the reel during this occurrence, resulting in considerable lost production and possibly increased maintenance costs. More attention to the process could prevent this from happening in the first place.”

## Drying Trends

Although a TAD system can produce superior sheet qualities, most new capacity does not utilize the technology for several reasons, Charles explains. “Through-air drying is good if you want to produce, say, a highly absorbent, fluffy paper towel grade. In fact, you can generally tell by just looking at and feeling a product in a store whether it’s made with TAD or not.

“But TAD has several disadvantages. First, it’s very expensive compared with conventional Yankee dryer systems. Second, and maybe even more important, TADs run at slower speeds than most Yankees, because of the longer dwell times,” he says.

Some tissue machines today have a combination of a TAD (possibly even two) followed by a traditional Yankee dryer and hood, Charles notes, because creping can’t be done off of a TAD dryer. Such combinations can be operating “nightmares,” and their capital costs, obviously, can be astronomical.

A third consideration in a TAD versus a conventional Yankee dryer is energy. In addition to consuming very large amounts of gas, TAD systems generally have very large fans driven by high-capacity motors, he says. These extremely large motors consume lots of energy.

Unless a mill really has a need for the extra quality of a TAD system, it’s not the most efficient way to go, Charles continues. “TAD is market driven. Some of the large discount retail chains such as Sam’s Club and Costco are now stipulating qualities that, in most cases, can only be produced with a TAD system. But a few machines are able to mimic TAD quality using some creative and “odd” approaches to creping, he says.

Some of the approaches currently being developed involve creping by differential speeds, e.g., “scuffing” the sheet or slightly “munching” it up. This can be done in the

transfer between two fabrics, via a pressure-roll-to-Yankee speed differential, etc. Whatever approach is used, overall machine runnability becomes critical, requiring diligent attention to process details, Charles emphasizes.

## Tissue Industry Challenges

There are some real challenges still plaguing the tissue industry today, Charles says. One is the continuing influx of recycled fiber in tissue furnishes, which is currently around 50%, depending on specific grade. “Occasionally, when using large percentages of recycled fiber, stock on the machine can change quickly, without warning.

“There can also be problems with certain chemicals that come into the system with recycled fiber. These can ruin the coating, or cause drying to occur too easily or too difficult. These kinds of things can create real hardships for the operating crew.

“Many of the tissue machines we see today are ‘middle aged’—not built in the middle ages but operating in the middle of their operating lives, i.e., not always the latest and greatest technology. This includes the instrumentation they have. In fact some of these machines are running with no more instrumentation than they were born with,” Charles says.

But at the same time, he notes, other tissue machines are very much up-to-date with modern instrumentation, including online monitoring of vibration, constant quality control checks, etc. In general, the tissue business is like most other sectors of the paper industry. Mills have had to reduce staff in recent years, and most really don’t have the technical resources they once had. Smaller companies, especially, don’t have a large corporate technical center, so maintenance and very close attention to details at the mill level are vital to their survival.

“Occasionally when there is excess capacity, as has happened off and on during the past few years, a few of the older, smaller machines fall off the bottom rungs of the ladder. But I would say that today, the state of the tissue industry in North America, Europe, and elsewhere in the world is pretty good. Companies making tissue and towel grades have a market that’s not ever going to go away. We will never have a paperless society in that regard,” Charles concludes. ■

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*Editorial Director Ken Patrick can be reached at [kpatrick@paperage.com](mailto:kpatrick@paperage.com).*