

The Right Color Makes All the Difference

The Adolf Jass mill in Fulda has succeeded in getting the color of its recycled linerboard just right using a three-dye system computer-controlled in real time by a color measurement unit.

By Jussi-Pekka Aukia



Papierfabrik Adolf Jass' Fulda mill has used recycled paper as a raw material since it started operations. Recycled paper has become a global commodity over that time, says PM4 Production Manager Rolf Kupfer, and prices are now determined globally.

"The paper recycling rate in Germany today is over 75%, and we don't expect it to go any higher, as not all paper can be recycled and paper fiber cannot be recycled indefinitely anyway," Kupfer explains. "Fiber quality has fallen off in recent years, as there's too little virgin fiber in the chain."

Despite this drop in quality, the quality of recycled fiber can still be managed effectively by careful sorting and pre-treatment, to ensure that the outer layer of corrugated board is sufficiently strong. To achieve this, the raw material for different end-products needs to be selected from different inputs.

This is all the more important today, as the market is placing ever-tougher demands on the quality of board.

"Developments are moving towards lower grammages, use-specific packaging, and tighter corrugation—all of which mean that linerboard needs to be stronger. Our Rudolstadt mill is focusing on low-grammage grades, while we at Fulda are focusing on heavier, stronger grades," says Kupfer.

COLOR IS CRITICAL

Linerboard produced from recycled raw material in Europe is always dyed brown to resemble that produced from virgin fiber. Considering that the mill produces testliner out of OCC (old corrugated containers), dyestuffs are needed to give the paper the brown color that is recommended for the outside layer of corrugated boxes.

Thomas Hubbe, Global Product Manager for Kemira says the brown color imitates the natural brown shade that Kraftliners have. "Kraftliners are made out of unbleached, and therefore deep brown, Kraft pulp. When OCC as pulp material is used, the paper would be greyish if not dyed by a brown color or color system."

Kupfer concurs that color is critical. "Packaging plays an important part in marketing the product it contains. 'Dirty gray' packaging just couldn't cut it with the European consumer. If material wasn't dyed, there'd be too much color variation in any case.

"Packaging converters don't want the color of the material they use to vary between batches, as packaging is generally produced only when it's needed. As a result, a product run can often use the end of one roll and the beginning of another, and if the color of the two rolls varies, it's a problem."

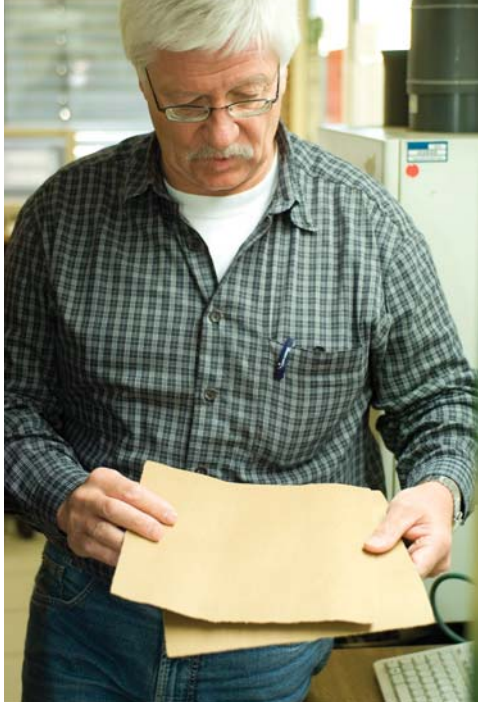
Fulda has dyed its board from the start. Powder dyes were used originally, and dissolved in water on site before being blended into the pulp. Liquid dyes were introduced in the mid-1980s, and brought a major improvement in usability, and reduced color variation as well.

"We switched to a combination of pulp and surface dyes around the same time, as it was cheaper. We dropped this after the mid-1990s, though, as a voluntary measure to improve our environmental performance," remembers Kupfer.

"It was believed that the cationic basic dyes used at the time could pose a threat to rivers and waterways, and they were also not recommended for food packaging use. The new anionic direct dyes that replaced them were safer, but the surface dyes didn't work with a cationic surface size, so we switched to stock dyeing at the mill."

To meet customers' need for consistent linerboard color, the mill installed a real-time measurement and control system in 2000. A new anionic dye blend was introduced in 2002. The system initially controlled the dosage of only one color mix, but had the capability to handle a number of color components, should the need arise.

"Construction of the Schwarzza mill took up most of the Jass Group's development resources in 2004, so work was put on hold here at Fulda. In 2005, though, we started an investment project aimed at introducing a three-dye control system, and we got it up and running by summer 2006."



Getting it right.

Rolf Kupfer, PM4 Production Manager, says color consistency from roll to roll is a top priority at the mill.

JUST RIGHT

The three liquid dye components used on both linerboard machines at Fulda – yellow, brown, and blue – are dosed into the pulp just before it is pumped into the machines' wet ends.

The closed loop control system, supplied by X-Rite (formerly Gretag MacBeth), analyzes the color of the web on PM4 just before reeling, and regulates the relative dosage of the different dyes on the machine by computer with a delay of around seven minutes. As both machines receive their pulp from one and the same line, they are able to run PM3 with the results of PM4 by calculating.

"Dosing like this reduces the amount of colorant needed, as you can adjust the dosing to the amount of dyestuff already contained in raw materials.

"The control range is typically in the order of one part in a hundred, but the system can handle larger swings if needed. Dyestuff can also be fed manually using default values if there are system problems, to ensure that production is not interrupted," explains Kupfer.

"The system ensures that the color of our end-product is always consistent. If we were to use a ready-prepared dye blend, changing relative color would either lighten or darken the effect."



It's a wrap. The Adolf Jass mill in Fulda is the largest producer of testliner and corrugated medium in Germany, with an annual output of 920,000 tonnes.



About Papierfabrik Adolf Jass

Papierfabrik Adolf Jass is a pioneer in the recycled liner board business in Germany, and something of an odd man out locally, as it is one of the few paper products companies that continue to be completely family-owned and managed.

“Adolf Jass set up his first mill in Gronauh near Hanover in the 1960s, and built his first packaging board machine using components from a number of sources to produce 100% recycled corrugated linerboard and corrugated medium,” says Rolf Kupfer.

“Jass’ analysis of the potential of recycled material in the packaging business proved spot on. He also always believed that the two Germanys would be reunited, so when the company was up and running well, he sought out a location for a new mill at Fulda in the geographical center of a united Germany back in 1970.”

Fulda was expanded at the beginning of the 1980s with the addition of a second machine. Following various upgrades over the years, this now has a capacity of 500,000 tpy. A third machine, a 7.5-meter-wide unit with a capacity of 420,000 t/a, was started up in Rudolstadt-Schwarza in Thuringia in 2004.

“With an annual output of 920,000 tons, we’re the largest producer of testliner and corrugated medium in Germany today. Adolf Jass, who’s 88 now, still works at the company, although operational management is now in the hands of a new generation.”

Reliable process. “Fulda’s two packaging board machines, PM3 and PM4, were last modernized in 1998 and partial new stock-preparation in January 2007,” says Rolf Kupfer. “They often run a number of different grades and grammages during the course of a single day, so the dye management system must be able to work very reliably.”

To achieve the desired shade of brown, the mill uses three dyes from Kemira—LEVACELL Yellow 5RC liq., LEVACELL Brown 6R liq. and LEVACELL Blue L liq.

“Our machines are now producing just the right color of product day in, day out. We’ve exceeded what was already an excellent 95% quality result with a 100% result. Achieving that last 5% has been critical for us, as it saves our customers and ourselves a lot of time, and a lot of bother as well.”

The switch-over to a multi-component system has also paid off financially. The new storage tanks and dosage system will have paid for themselves in about 18 months, according to Kupfer.

“The system has proved ideal for us in our present configuration. That’s not to say we’re not open to ways of improving things even further,” he says.

WORKING RELATIONSHIP

Papierfabrik Adolf Jass has worked with Kemira and its predecessors for over 20 years, and has allowed its supplier to test new product generations on its machines for many years.

“It’s important for us to understand the difference between the laboratory and the mill floor,” stresses Kupfer.

“Our switch to more environmentally friendly chemicals 10 years ago, for example, took place as a result of joint trial runs. Kemira—or Bayer-Lanxess as it was known then—tested up to five mixing dyes in parallel on our machine to identify the best choice. This allowed us to see very clearly which of the dyes worked and which didn’t.”

Hubbe explains, “Our dyes are direct dyes that are negatively charged. This negative charge is more environmentally friendly as opposed to basic dyes which are cationic. Cationicity in effluents can cause harm to fish species and does therefore lead to higher ecological measures at a mill.

Furthermore, our direct dyestuffs are classified WGK 2 (German Water Hazardous Classification) as opposed to basic dyes which are WGK 3,” Hubbe added. “For dyestuffs of WGK 3, a paper mill needs to make sure that the full volume that is stored at the mill in storage vessels can not reach the soil. This means that the mills have to invest a lot in concrete soil seals, which become very cost intensive.” ■

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