

The Business Side of Sustainability

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For papermakers, the pursuit of “sustainability” has produced innovations in chemistry that boost productivity, and minimize water and energy consumption.

By MARTIN KOEPENICK, INNOVA

Traditionally, the focus for a wide range of paper producers had been to deliver high productivity with little concern for the amount of raw materials and energy employed; just get as much product as possible to the marketplace and keep things running. Many did this very effectively.

Today’s expectation is still high productivity, but the difference is a change in the definition of success. Success today also requires a reduction in raw material usage, reformulations to lower costs, minimization of energy employed, and tighter control of water usage.

Beyond the mill, fine paper grades must meet the needs of digital presses running with entirely new inks. Packaging grades must be lighter but stronger, and eliminate proven coatings in favor of new, green formulations. Add in the pursuit of increased quality of life for communities and employees at the mill — profitable for stakeholders and shareholders alike — and you can see the sweeping reach of the sustainability equation.

Because of the increasingly important business dimension of sustainability, top management from many global companies is actively weaving the “less is more” concept and the bigger picture dimension of sustainability into their long-term plans, often measured by each operation’s carbon footprint.

“Mapping the carbon footprint of production facilities has become commonplace and part of the cultural change at pulp and paper mills,” says Fred Clark, vice-president, sustainability at Eka Chemicals, the AkzoNobel pulp and paper division. “Often the reduc-

tion targets are challenging. At Eka and the other AkzoNobel business units, we have taken the initiative seriously and are aiming to reduce our carbon footprint by 10% in 2015 relative to 2009. Our ambition is to achieve a 20-25% reduction by 2020. Partnering with leaders in the pulp and paper industry, including NGOs, to support sustainability efforts and helping them reach ambitious goals is fundamental to our own success.”

With this approach, Eka Chemicals joins a forward-thinking cadre of chemical companies that are addressing their own carbon footprint, and compiling sustainability data about their products for customers. Sun Chemical, for example, has just made carbon footprint data available for its product lines.

At Eka Chemicals, “more and more customers ask for eco-profiles of our products,” confirms Clark.

High-performance chemistry

Sustainability challenges usher in a new role for chemistry, which requires a holistic view from the forest through pulp and papermaking, as well as the processes that follow, always working in innovative ways to meet continuously increasing demands for a more sustainable industry.

As Tom Lindstrom, a professor at the Swedish Royal Institute and a guru in sustainable packaging and innovation sees it, “Reducing the use of fibre remains on the forefront of this effort, through basis weight reduction in packaging grades, or filler substitution in fine papers. This means a greater role for chemistry, including utilizing retention, drainage and strength enhancements in new ways, or taking advantage of new

product or application technology in these areas.”

“On another front,” he continues, “nano-cellulose developments are advancing quite rapidly to enhance strength to entirely new levels, which will bring about all kinds of innovations in formulations. It’s interesting to note the keen interest from entrepreneurs in the cosmetics, medical, food and many other industries who are contacting us from all over the world to tap into the inherent properties of nano-cellulose for their own performance and sustainability reasons.”

Lindstrom also notes that there’s a lot of interest in the use of clays for bio-barriers, which also fit into the sustainability model.

Process improvement through better chemistry is not a new phenomenon. “We have been developing and promoting sustainable products and providing sustainability benefits since our invention of the microparticle-based retention system 30 years ago,” says Mark Zempel, paper chemicals marketing manager for Eka Chemicals. “The modern versions of this concept are now allowing unprecedented filler levels in graphic grades, maintaining or improving productivity and quality at the same time. Similarly, use of new retention, dewatering and strength concepts is allowing board producers to reduce basis weights, optimize furnish mix, and increase productivity. These each contribute positively to a mill’s sustainability metrics — improved productivity, for example, can result in fewer resources (energy, water, etc.) consumed for each ton produced.”

In concert with advances in chemistry, much has been happening on the paper

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By having employees participate in Robert Swan's Leadership on the Edge 2008 Antarctica expedition, AkzoNobel encouraged the company's future leaders to act as real ambassadors for sustainability in their jobs and everyday life.

equipment side to attain the same goals.

Alain Lascar, director of applications and marketing for Kadant's fiberline group, explains: "In the recycled fibre sector, we are helping customers utilize contaminated, but high quality fibre, gaining a high yield, reducing energy costs, and minimizing the chemicals employed. While we do try to help lower chemical costs, we have a high respect for high performance chemistries, because they deliver advantages needed to produce a sheet with fewer imperfections. Just as we deliver more fibre from waste paper, effective nanoparticle systems retain more of the fibre, minerals and additives in the sheet."

Better, lighter base sheet

Globally, today's base sheet is typically more uniform, even though it's produced at very high speeds. The ratio of filler to fibre has shifted notably in the direction of filler, sometimes to nearly half the content of the sheet. Ranging from newer alternatives such as eucalyptus fibre to heavily contaminated waste fibre, or even bamboo, bagasse and straw, paper formulations in the new millennium are entirely different, continuing to evolve to incorporate fibre from sustainable resources.

Complimentary to the fibre changes, applications of advanced chemistries at the wet end have become standard practice. But there is nothing standard at all about the effect they have had on retention of fibre, minerals and other additives. Greater knowledge of the sheet on a nano level allows for impressive productivity at lower dosages of advanced chemistry. What's more, the base sheet can be designed to be single-, double-, or

triple-coated more precisely.

Consider the sustainability implications of Eka Chemicals' fourth generation nanoparticle, anionic colloidal silica. The product has a high structure and surface area and is typically added after the screen. It dramatically reduces chemical addition because of its strong interaction with polymers and starch. As with the previous generations, this nanoparticle silica product is in and of itself a sustainable chemistry: an inorganic colloidal mineral in water with no VOC impact and requiring very simple dosing equipment.

The true sustainability impact, however, is on the paper or board process itself: even small amounts of this new product allow reductions in other, less sustainable additives, and provide new maximum levels of performance in retention and dewatering. In one case, production rate increased more than 10%, while sewer losses were reduced due to improved retention of fines and filler. In other cases, dramatic reductions in wet strength resin or retention polymer have been possible along with the productivity gains.

According to Eka Chemicals' Zempel "When you combine these new additives with best-in-class injection technology like Wetend Technologies' TrumpJet systems, you maximize their performance while also making huge impacts on water and energy savings. Using thin stock as the dilution medium reduces water consumption and also prevents the need to heat it to process temperature."

Faster-drying sheet has energy bonus

In addition to a reduction in raw materials costs, another benefit of increased

filler content is energy savings. Clay and carbonates dry much more easily and quickly than wet fibre.

The addition of filler can dramatically increase the drainage rate and the water removal rates during pressing and drying. With 20% filler addition, the drainage time often decreases by 20% compared to the unfilled paper. Energy gains are the inherent result. Indeed, in mill trials, 4 -5% starch encapsulated kaolin clay was shown to have no statistical impact on strength and slide angle, to provide faster drainage and drying, and to reduce steam demand by 10%.

Sustainability a sustainable trend for paper

Sustainability progress will continue to accelerate throughout the pulp, papermaking, converting and printing processes, especially as alternative value-added solutions make "attainability" happen sooner and at lower overall costs.

In addition to its own goals regarding greenhouse gas reduction and water management, Eka Chemicals has a business goal of having 30% of revenue from eco-premium solutions by 2015. Eco-premium refers to those solutions which are superior to the mainstream competitive solution with respect to energy efficiency, use of natural resources, emissions, toxicity, waste, and land use.

Clearly, papermakers can expect more options in their pursuit of sustainability.

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Patrik Simonson, for instance. Not only has he helped develop and fine-tune the Compozil retention system in our lab in Sweden, he's also worked on various new applications where it truly matters – at our customers' mills.

Access to all the necessary equipment used by professional papermakers makes our R&D that much stronger, in Patrik's

eyes. Careful preparation and planning is vital, but practical experience of chemicals, processes, machines and people near and far guides the work in the lab and makes Eka's innovations truly safe to use.

And every time he's on site, more ideas are born. All of them with one purpose: making your whole papermaking process that much more competitive.

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