

global packaging research

the international packaging research and education newsletter

> Reading the EU Commission's Resource Efficiency Roadmap

Since its publication this autumn, the EU Commission's Roadmap to a Resource Efficient Europe has stimulated a mixture of suspicion and interest among industry groups and research institutes.

Packaging merits just three mentions in the document's 24 dense pages.

It recommends that: "Member States, with the Commission, should as of 2012 assess actions to optimise the resource efficiency of packaging." It identifies the need to "improve food packaging for better preservation and recyclability". Biodegradable materials warrant a mention, too.

The Roadmap proposes: "By 2020, energy recovery is limited to non-recyclable materials." Kennert Johansson at Innventia believes this means that more attention will need to be paid to sorting and recycling technology.

He argues: "With this Roadmap, the issue of material resources becomes an important consideration in packaging development."

Despite the few explicit mentions in the



document, outgoing MD of European Julian Carroll believes that, if followed through, it will have a clear impact on packaging choices. "There could be minimum performance standards, which could remove the least resource-efficient products from the market," he says.

The document concludes saying: "The Commission will prepare policy and legislative proposals to implement this Roadmap."

Meanwhile in the UK, the food waste and packaging reduction figures for the latest phase of the voluntary Courtauld Commitment have been published. During 2010, one year into a three-year programme, the grocery retailing and manufacturing signatories had travelled over halfway towards their 10% packaging weight reduction target.

There was a 3% cut in household food and drink waste, compared with a three-year target of 4%. But supply chain product and packaging waste fell by just 0.4%. Here, the three-year target is 5%.

<http://ec.europa.eu/environment>

> Deadline for Cal Poly papers

Researchers intending to submit papers for consideration at the Cal Poly State University, California, IAPRI 2012 Conference are reminded that the organisers should receive all submissions – peer-review full papers and non-peer-review abstracts – by December 17th 2011.

Two of the keynote speakers have been announced. Dr Amar Mohanty will talk about the future of bioplastics and

biomaterials, while James Porter will discuss North American containerboard supply to global markets.

IAPRI members attending the Conference in San Obispo, California (17-21 June 2012), will also have the chance to vote on which researchers should receive IAPRI's new research scholarships (see p2).

More Conference details at:

www.iapri2012.com

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“The optimisation of resources, whether through renewables, recyclability or overall cradle-to-grave design, will grow in importance”

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Roadmaps and diversions

Packaging has come on a long journey over the last 15 years. In Europe, we saw materials reduction bring about a decoupling of packaging consumption from Gross Domestic Product (GDP) growth, in the decade to 2008. Importantly, improvements in materials properties have allowed less packaging to do more.

Carbon footprint and climate change took centre stage from the turn of the Millennium, and carbon footprints on packaging became hot stuff. But since then, evidence showing how in Europe we waste 180kg of food per capita has been a real eye-opener.

It has also become clearer that we can only talk about sustainability and environmental performance when we link the packaging with the product.

This is truer than ever now that the EU has provided a Roadmap (see p1) for the next stage of the journey. If we are to reach our targets on climate change and resource scarcity, we have to start acting now.

In fact, packaging's contribution to total waste and carbon footprint is minor. Europeans consume on average 16 tons of materials each per year, eating, travelling and living their lives. This includes up to just 223kg of packaging, subject to many variables.

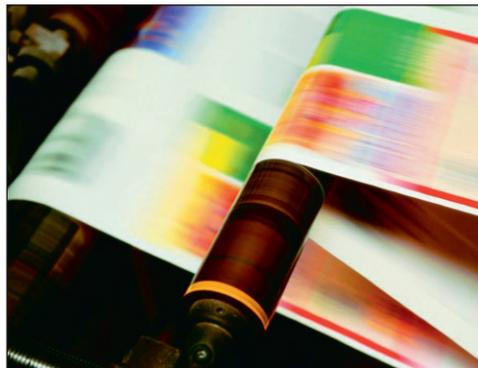
There is now a better understanding of packaging's role in product protection. But the optimisation of resources, whether through renewables, recyclability or overall cradle-to-grave design, is bound to grow in importance, making the packaging equation even more complex.

Kennert Johansson, Innventia

> Strong demand for radiation curing on packaging lines

Forecasts regarding radiation curing in the packaging converting sector show 24% volume growth in electron beam and ultraviolet (UV) cure inks, translating as 60%-plus value growth in global markets over the next five years.

A new study by industry association Radtech Europe and Pira International shows this growth bringing the value of the total market to \$883 by 2016.



Radiation curing brings a number of benefits to printers and converters. The ink, varnish or coating is cured immediately, with no need to slow or interrupt processes

for drying. Moreover, a high-gloss finish may mean that additional processes or treatments such as specialist lamination are not required. With instant curing, ink dot growth is minimised, giving sharper definition. And since the ink remains on the surface, this allows for greater impact on absorbent substrates.

The cured ink surface can also be tailored to provide an especially tough and resistant finish.

According to the study, inkjet using UV inks is migrating from its established place in the signage sector into label and packaging converting. This is expected to drive the largest growth in the industry, with UV inkjet for labels, cartons and flexible packaging forecast to expand in volume terms by a massive 250% over the five years to 2016.

Pira says it expects the crossover between digital print and UV inkjet to provide the packaging sector with many of the benefits of short runs and customisation that the graphics sector is already seeing.

www.pira-international.com

> IAPRI scholarships update

More details are available regarding the two research scholarships being offered by IAPRI for the academic year starting in September 2012.

The two scholarships, each of £5,000 sterling, are applicable to graduate students undertaking a research project at an IAPRI member university or research institute. The research period will be for at least six months, with a supervisor involved from the start of the application process.

After the application deadline of 1 March 2012, four applicants will be shortlisted by the Scholarship Selection Committee. The successful pair will then be selected by IAPRI members at the IAPRI 2012

Conference at CalPoly, California, 17-21 June 2012, on the basis of presentations, with final notification in July.

The sum of £5,000 will include £1,000 towards travel to the 2013 IAPRI Symposium in Finland, June 2013, for an oral presentation of results. In addition, if the research is undertaken at a host institute, air fare costs of up to £500 per scholarship will be covered.

The full background and application 'pack' is available at:

www.iapriweb.org/scholarship.

For more information, contact general secretary Marie Rushton:

marierushton_iapri@another.com

“*The issue of packaging optimisation should be seen as being part of the solution rather than part of the problem*”

> European casts the net wide for consensus on realities of packaging optimisation

European has produced a Green Paper on Packaging Sustainability, offering a robust defence of packaging's role within wider definitions of sustainability and a clear view of how 'optimum design' should be interpreted.

Says outgoing MD Julian Carroll: "Because resource efficiency is – quite rightly – under discussion at EU level, we felt the time was right to gather stakeholders together, and not only those from industry. Packaging has a positive role to play, and the issue of optimisation should be seen as being part of the solution rather than part of the problem."

IAPRI member Innventia was among those contributing to the document. Brandowners Coca Cola, Danone and Procter & Gamble, representatives of the EU Commission, packaging companies Crown and Tetra Pak as well as members of the European Retail Roundtable were also involved.

The discussions emphasised the complex interaction between different considerations when working on packaging design, and the fact that no single consideration or factor can be taken in isolation. "Choices in one part of the value chain will inevitably affect another," it concluded.

It identified two questions which are said to go to the heart of this complexity. Firstly, how should the supply chain strike a balance between health and safety considerations and environmental concerns (especially with regard to food and drink)?

> New MD steps into Carroll's shoes

Véronique Bagge will be taking over from Julian Carroll as MD of European (the European Organisation for Packaging and the Environment) from the beginning of January 2012.

Bagge has previously worked in the toy industry, most recently for the European Commission and European Parliament, but also until early in 2011 as the group sustainability manager for a Danish toy retailer.

She is fluent in English, French and Danish and, though a French citizen and Brussels resident, was educated in Denmark.

Carroll's new role will be as a consultant on packaging sustainability and trade association management.



And secondly, how should the value chain effectively manage the different economic and environmental costs and benefits of different materials, designs, applications and logistics systems to make the right packaging decisions?

One critical area is the role that packaging plays (and is increasingly recognised as playing) in preventing and reducing food waste. Those contributing to the Green Paper said they were supportive of smaller portion sizes, for instance, if this decreased food waste.

Moreover, the paper argued, packaging innovation can help to increase shelflife. In some cases, stakeholders judged, additional packaging materials would be justified if shelflife was prolonged sufficiently to have a significant impact on food waste.

Finally, European has long taken the view that strict adherence to the established waste hierarchy is no longer appropriate. The Green Paper addresses the need for priorities to be based on the needs, systems and infrastructure of a given country or region.

www.european.be

> RIT broadens its research – and recruits

Rochester Institute of Technology (RIT) in the US says it is expanding the focus of its packaging research and, at the same time, recruiting for an Assistant Professor in Packaging Science.

In fact, says Dan Goodwin of RIT's College of Applied Science and Technology (CAST), the position currently being advertised at CAST's Manufacturing and Mechanical Engineering Technology/Packaging Science

department is as a replacement for a retiree.

"However, we are expanding our research base to include more emphasis on food, pharma and medical packaging," says Goodwin, who is also the search committee chair.

Evidently, RIT is looking for an individual with strong educational as well as research capabilities, since the job description talks about someone able to "take a leadership

role in the creation and instruction of graduate and undergraduate packaging science courses".

The start date for the position is August 2012.

Anyone interested can find the vacancy – and apply – online at <http://careers.rit.edu>, under Faculty Search: IRC 51874. Goodwin can also be contacted directly with any queries at: dlgipk@rit.edu.

“Several of my students are ‘sold’ on the idea that packaging can somehow prevent this awful problem of pharmaceutical counterfeiting”

> Anti-counterfeit strategies and tactics

What role should independent and academic research institutes play with regard to anti-counterfeit packaging? We talk to those who work on strategic issues and those who develop – and commercialise – solutions

As in the world of computer virus protection, scientists working in anti-counterfeit technology know that they may win battles but that they are not expected – or likely – to win the war. One day, they will be playing catch-up with a given threat, the next day pre-empting another (which they may never know they have pre-empted). But they are unlikely to be out of a job the day after that.

Doug Moyer is research manager at the Anti-Counterfeiting and Product Protection Program at Michigan State University’s (MSU’s) School of Criminal Justice. He also helps to manage IAPRI’s Anti-Counterfeiting, Product Safety & Security Working Group. He takes up the theme of winning (at best) battles rather than wars in the specific context of pharmaceutical counterfeiting and public health.

“Several of my students are ‘sold’ on the idea that packaging can somehow solve or prevent this awful problem,” he says. “But they are redirected to Food & Drug Administration (FDA) documents which state that, with respect to packaging, there is no ‘silver bullet’.”

Specialist knowledge

Despite – or perhaps because of – this reality, there is continuing demand for expertise in anti-counterfeit packaging (ACP) in at least two areas. Firstly, brandowners require a stream of technologies which are cost-effective and just plain effective, at least for a while. And secondly, there is a need for strategic oversight.

That is not to say that demand for solutions and strategy is constant. “As an issue, ACP comes and goes, and recently, the economic downturn has had a real effect on priorities,” says Moyer. Sustainability as a priority in packaging has suffered in a similar way, he argues.

This is one of the challenges. But there has been a more general reassessment over the past few years of how the applicability and potential role of ACP can be predicted in particular cases. In a sense, says Moyer, this stems from a clearer acknowledgement that forecasting risk, the nature of that risk – or the lack of it – is an inexact science.

Donald Rumsfeld famously talked about “known unknowns” and “unknown unknowns”, and Moyer suggests there are similar distinctions to be made in the anti-counterfeit world. “When brandowners ask ‘How big is my problem?’, you can only point to what you know,” he explains. “You’re still taking a complete swag at all the rest, which is essentially unknowable.” For corporations, it may be a matter of known tangible costs with unknown and intangible benefits.

Even the dimension that these risks operate in can be difficult to establish. “Food fraud, for instance, poses a clear public health threat, even though it may be economically motivated,” says Moyer. It may not even be clear under whose jurisdiction – the FDA or the Federal Bureau of Investigation (FBI), in the US – a crime of this kind falls.

Packaging can provide solutions to the problems of food fraud at a couple of different points. He cites the example of products from the Far East for which there are ‘anti-dumping’ laws in the US. To avoid these restrictions, product may be shipped through several different countries before final importation to the US. In these instances, packaging can still play a track-and-trace role, both in terms of what the authentic product is and where it came from.



VTT's 3D surface imaging technology

Secondly, he says, packaging can provide reassurance at the point of consumption that a food product is good quality and safe to eat.

That is the theory. But in practice, particular technologies can end up providing false reassurance to consumers rather than genuine protection to brandowners. Holograms, which used to be proprietary, are now no guarantee of authenticity. “When anti-malarial drugs were being copied in Southeast Asia recently, the holograms used were better quality than those applied to the original packaging,” Moyer reports.

Legislation is not steering people away from security features. If anything, it's tending to mandate them

Two-dimensional (2D) matrix codes are a more contemporary double-edged sword. "This is seen as a whole new opportunity to involve the digitally-empowered consumer in the verification of product authenticity," he says. "But is there a real risk? Or are you creating a new risk – and an opportunity for criminals?" The codes are easily counterfeited and can lead consumers to bogus authentication websites, he explains.

Working on solutions

This type of 2D code is one that has been explored by VTT in Finland. But as principal scientist Maria Smolander explains, when combined with inkjet-printable indicators and functional inks, such codes can double up as quality indicators and anti-counterfeit systems.

This is the case when these codes have an overt quality verification role for consumers. But VTT has taken camera phone technology even further for covert security applications. An add-on microscope module allows a humble mobile to provide 3D surface imaging.

Overall, ACP appears to be a thriving area for VTT. Based on this 3D imaging technology, spin-off company KeepLoop was established earlier in 2011. This year also saw the Finnish research institute set up Iscent, a business spun-off as a home for its roll-to-roll hot embossing technology. This hot embossing can create dynamic graphics as nano-patterns directly on transparent or non-transparent packaging, Smolander explains. It can be integrated into a printing line and used for authentication purposes.



Nicanti is now marketing VTT's printed electronic code technology

The challenge is to create a genuine technology barrier to potential counterfeiters, while containing the process adaptation – and, critically, the cost – required from the end user. "VTT has taken a multi-disciplinary approach to developing different technological solutions for

high-volume applications such as consumer packaged goods," says Smolander.

Caveat emptor

At MSU, a parallel 'multi-disciplinary approach' has been taken to strategic considerations. In the context of food fraud, says Moyer, this combines insights from food science, packaging science, supply chain management and criminology.

On the level of practical ACP solutions, the advice remains to utilise multilayer and overlapping features, says Moyer, potentially including overt systems (available to consumers), covert systems (verifiable by staff) and forensic systems for use in a lab.

And despite the logic which says that economically straitened times will see ACP being given less attention, there are some more favourable indicators for the sector. The ever-widening spectrum of relatively affordable technologies is clearly one point in its favour. But regulatory changes are also likely to have an impact.

In the US, the Food Safety Modernisation Act, signed into law almost a year ago, is just one (if a rather major) global regulatory measure designed to facilitate "end-to-end visibility of the supply chain", Moyer points out. "Legislation is not steering people away from security features. If anything, it's tending to mandate them."

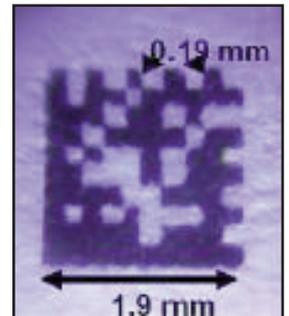
But this comes with some fairly heavy caveats. "The legislation itself does not provide any tactical guidelines. There is no silver bullet," he repeats. "In the end, whatever technologies are used, they can only act as a deterrent, and not as a failsafe solution."

There is another caveat. The target of 'end-to-end visibility' can run up against 'unknown unknowns' not only on the level of threats but also at the level of impacts on the consumer, says Moyer. "In the pharmaceutical area, for instance, total supply chain visibility could fall foul of patient confidentiality safeguards. If a patient has a prescription for a sensitive drug such as Viagra, just how far should – for example – the RF tracking go? And who would have access to that patient information?" he asks.

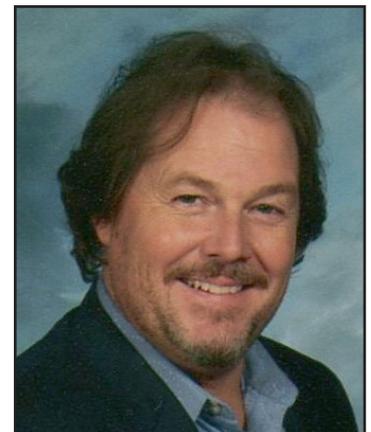
Packaging science may have come up with a wide range of answers, but ACP seems to generate plenty of questions, too.

www.a-cappp.msu.edu

www.vtt.fi



VTT uses 2D barcodes with printable indicators



Doug Moyer

“ Topics include packaging and the older consumer, where we have done some work with researchers at Kasetsart University, Thailand ”

Massey University, New Zealand: overlapping education and research

If you are searching for evidence of creativity and technical grasp among packaging students at New Zealand's Massey University, you need look no further than one of its 2011 award winners.

In this year's Environmental Packaging Awards, Michelle Power won in the category of Conceptual Design by a Tertiary Year Student, sponsored by the SCION Research Institute. The awards are organised by the Packaging Council of New Zealand.

Her 'One Size Fits All' concept takes a single corrugated board sheet and ensures it can accommodate a range of product sizes and shapes. The judges thought it was a clever design, with the potential to help small businesses – and to be highly commercial.

So what is the teaching programme which helps to generate such versatile and technically adept thinking? Tom Robertson, senior lecturer in Packaging Technology in the School of Engineering and Advanced Technology (SEAT), provides a guided tour.

There is some undergraduate teaching of packaging science as part of the Bachelor of Food Technology degree, and Massey's Masters in Engineering Practise includes a Packaging Technology option. There are also packaging-related lectures and a packaging design project for fourth year students studying Product Development Engineering.

As an indication of its quality, the honours degree is one of only two Food Technology university courses outside the Americas which are accredited with the US-based Institute of Food Technologists (IFT).

“We also have available a research-based Masters of Engineering, which includes packaging technology,” says Robertson. “There are currently two students doing research. And at present three PhD students are doing research of relevance to packaging technology.”

Packaging research at SEAT is directed by Robertson and Prof John Bronlund, who specialises in mathematical modelling systems. “Topics include packaging and the older consumer,” says Robertson. “Here, we have done some work with packaging researchers at Kasetsart University, Thailand.”

He adds: “We have looked at modelling the moisture and gas permeability of corrugated paperboard and polymer systems, and model-based integration of packaging, distribution chain



Michelle Power's award-winning concept

and food quality systems.”

Other modelling-based research at SEAT has focused on volatile agents which

could form part of a smart packaging system as well as oxygen permeability and fat oxidation in emulsified systems.

“Some of this research is in conjunction with the SCION, Carter Holt Harvey Corrugated Packaging and Heinz Watties,” says Robertson.

Elsewhere, research is carried out in conjunction with the Institute of Food, Nutrition and Human Health as part of the Centre for Postharvest and Refrigeration Research. This is typically in areas such as optimum handling and storage for products such as kiwi fruit, including investigations into the role of packaging design in influencing rates of cooling and maintenance of appropriate storage temperatures. In the case of kiwis, research has been carried out together with key industry groups in New Zealand such as marketing organisation Zespri.

Packaging research and teaching has been part of the university's Food Technology Programme since the 1960s. A distinct Packaging Group took shape in the late 1980s. The original Degree in Packaging Technology was recast as a Graduate Diploma.

Much research has arisen out of the needs of the agricultural and horticultural sectors and food industry. Funding has come from government as a part of general university funding, but also linked to the Ministry of Science and Innovation. Research also benefits from private company project finance.

<http://seat.massey.ac.nz/>