One of the main topics at this year’s IgraExpo in Amsterdam is expected to be the so-called ‘chemistry-free’ or even ‘processless’ newspaper plates. But what does this actually mean? CARYL HOLLAND visits Kodak’s r&d facilities in Windsor, Colorado, to find out

VIRTUALLY ever since computer-to-plate (ctp) technology was introduced, the holy grail has been to develop a processless digital plate. This is not surprising really since who doesn’t want to eliminate plate processing?

Not only does it mean a reduced need for people and hence lower labour costs but it also eliminates a number of the variables in the production process. Then, there is the cost of plate processing consumables, plus the cleaning and maintenance of the processor. If to this is added the environmental factors, it all adds up to some significant benefits.

To understand what has to be done to achieve a processless plate, it is necessary to go back to basic principles. What better place to do this than at Kodak’s research and development facilities at its plate manufacturing plant in Windsor, Colorado. For one thing, Kodak is somewhat unique in that it not only designs and manufactures platesetters, plates and digital workflows for the newspaper market but it also uses both thermal and violet laser technology. In addition, the core competency of the r&d labs at Windsor is what it calls its ‘process’ digital plate technology.

As is explained by Chris McCullough, head of the research and development group at the Windsor plant, although offset litho printing is taken for granted, technically it is an amazing achievement. For instance, an image measuring, say, 40 x 28 inches is formed by splitting a film of ink four microns thick, not once but twice - from plate to blanket and then blanket to paper.

The ink is emulsified in an aqueous solution to a depth of a few molecules and with an image of this size, is carried by 19,250,000 halftone dots averaging 0.19 micron in size. Consequently, each microns. And if this is not bad enough, all this has to happen in a quarter of a second and could be required to occur up to one million plus times in succession.

As McCullough points out: “When you think of what the ink, the fount and the plate are doing, it is a stunning tribute to the robustness of litho.”

But like this, it is also obvious that the plate’s job is not an easy one. Nor is plate manufacturing and, as McCullough admits, it is even harder making digital printing plates. As is explained by Mike Rundle, program manager, Kodak Graphic Communications Group: “With analogue plates, the energy is applied to the plate using either a step and repeat machine or a vacuum printer, which has not been exposed at the bucketful. This creates a greater reaction, enabling an enormous amount of latitude in the coating.”

“With digital plates, they are violet or thermal, you are putting energy on the plate with the equivalent of an eye dropper. So the reactivity needed in the coating and the consistency of that reactivity are exponentially different than for analogue plates”.

And there are additional challenges due to the automation of the modern computer-to-plate (ctp) systems. For instance, if the plates are not cut square every time, an automatic platesetter will not be able to load them. Also, if the interleaving is not right, you won’t be able to de-interleave them.

There are also enormous challenges on the coating side as is pointed out by McCullough. “A printing plate is a product full of conflicting requirements. For example, there is the hydrophilic/phobic balance – the alkaline substrate needs to carry water on press so it needs to be hydrophilic but the coating needs to accept ink on press so it needs to be oleophilic.”

“However, the coatings are organic formulations which require organic solvents and have to coat the hydrophilic substrate. In addition, portions of the oleophilic resin needs to be dissolved in an aqueous solution which is hydrophobic, while the remaining oleophilic resin has to stick to the hydrophilic substrate for many impressions on press.”

“The compromise needed to do all that is phenomenal. It is amazing that it works at all, and yet thousands of people use it every day without giving it another thought!”

“Admittedly, non-litho coatings such as paint are made all the time but they tend to be cared straight after being applied, on painting cars. We have to put a coating down which will survive at the customer wants and in exactly the right place,” continues McCullough. “Customers also want the coating to be as reac- tive as possible so that it images faster.”

“However, the more reactive it is, the more unstable it becomes. So another compromise is that the faster the plate, the more careful you have to be with the shelf life. All these compromises have to be balanced which is why it is so challenging!”

Despite this, since it was first introduced back in the early 1990s, digital plate technology has improved significantly. As is explained by Jack Knadjian, vice-president of the newspaper market segment at Kodak’s Graphic Communications Group: “Today, most of the popular plates in the world of newspapers, whether thermal or violet, have at least two layers. The actual underlying technology in terms of their chemical make-up and structure is similar in the tank, which these days, is an alkaline solution of around pH 11, loosens the unexposed photo polymer and brushes remove it.”

“The photo polymer particles remain in the developer which consequently needs replacing at some point. It also needs replenishing.”

“We then rinse off the plate to remove any developer solution remaining, and the gum section applies a protective layer which is subsequently dried. This completes the six stages in a typical topopolymer process and is what we call the wet process.”

Knadjian then turns to the so-called ‘chemistry-free’ violet technology which, he believes, should be described more accurately as combined developing and gumming.

“With this, there is still the laser exposure to create the latent image in the pre-heat process to continue the cross-linking of the exposed image. In the next step we have to develop the plate using either a step and repeat machine or a vacuum printer, which has not been exposed at the bucketful. This is where the laser causes the sensitiser to release the ‘free radi- cals’ which start polymerisation or the cross linking of the monomers. At this stage, a weak temporary latent image is formed, not yet strong enough to survive the printing press.”

“The aim is to create as long a chain and as many chains as possible since that is what is going to give the coating hardness and consequently a long life on press.”

“The next step is the pre-wash, which removes the water-soluble PVA top-coating and exposes the polymer image layer. The plate is then put in the dip tank to remove the unexposed and therefore soluble coating. The developer...”

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things which are removed from the process are the pre-wash and the post-tint. This makes the process more environmentally friendly because it uses less water and has a lower pH value than the soiled gum solution still needs to be disposed. You also still have to maintain and clean the unit – as there is no pre-wash process, the solubiliser loaded with PVA as well as polymer which can cause biological growth.

Knadjian also questions whether the chemistry-free violet process is more stable as is also often claimed. “Two or three sections have been removed from the processor but rinsing does not make it instable. This is caused by variations in the Gaussian laser, and the pre-heat and clean processes, all of which are still required.”

Future prospects

Admittedly, Knadjian and indeed, Kodak generally, does have somewhat of an axe to grind. For one thing, it does not manufacture a violet ‘chemistry-free’ plate, although it does offer the VioletNews ctp system including a violet plate for the lower end of the newspaper market where capital investment is an issue and higher productivity is required than is available with its manual loading thermal process. Secondly, and more pertinently, Kodak’s main focus is on thermal technology where it has a USP in the newspaper market.

Indeed, more impressively are the arguments in the future potential for thermal technology.

“We have always had the advantage of the thermal equivalent of the violet chemistry-free plate,” says Knadjian.

Indeed, this technology which Kodak is calling ‘simple process’ was demonstrated in the labs at Windsor during our visit. The key to this technology is that it eliminates the need for pre-heat which is still required for the violet chemistry-free plates. As Knadjian explains: “With the simple process, because the thermal laser can deliver such high amounts of energy, it can penetrate the sensitivity to release enough ‘free radicals’ to complete the polymerisation of the monomers and so form a press-ready image. There is therefore no need to pre-heat and so we can go straight from exposure into a simple one bath processor where a mild wash-out fluid with an almost neutral neutral pH removes the PVA top-coat and the unexposed polymers. The plate is then ginned and dried, and is ready for printing. So, with such a technology, we are down to two processing steps, develop and gum.

“However, we made a conscious decision to skip this intermediate development stage and go straight for a ‘non-process’ newspaper plate. In other words, a plate which does not require a separate processor and is ‘developed’ within a few revolutions of press.

Indeed, Kodak’s PP-N plate, which is an extension of its chem-free technology, although not plate is already being used at some 15 newspapers in the United States.

“The way it works is that the fourth component is the photopolymer which allows it to be removed by the ink,” explains McCullough.

Both McCullough and Knadjian believe that such a system would be practically impossible to achieve with violet technology. As McCullough points out: “There are real big barriers against having a violet develop-on-press plate. For one thing, thermal technology allows us to operate in a white light environment whereas, due to the small amount of energy available from violet diodes, the violet chemistry has to be very reactive. To stop it fogging, it needs yellow lighting which makes it difficult to mount the unprocessed plates on press.”

McCullough also points to the need for pre-heating. He admits that violet diodes are becoming more powerful and so might be able to overcome this. However, since the exposure energy in a thermal laser is already over 1,000 times more than the current violet diodes, he doubts very much that they will ever reach parity, at least not at an acceptable price due to insufficient market demand to make mass production viable.

Mind you, as Knadjian admits, the existing PP-N develop-on-press newspaper plate is not for everyone. It is currently being aimed at the low end of the market where the annual plate consumption is some 10,000 square metres. One reason for this is that currently the plate is not fast enough for mainstream newspapers although Knadjian cannot see why this will always be the case. McCullough agrees.

“The challenge is productivity and this is why we have targeted the small to mid-sized newspaper market. Currently, for a double-truck plate for, say, a Goss Community press, it is around 27 plates an hour. Another current possible drawback is the relatively light image created. This is said to be readable by some machines such as optical punch benders but not at the moment by densitometers. The reason for this is to eliminate press contamination as Rundle explains: ‘Develop-on-press technology is not new. However, those early plates did contaminate the press. There were two reasons for this. One was the colour agent which you had to put in the coating to make the image highly visible. It was the same colour agent as used in the standard processor but when it was removed on press it contamined the light colour inks. We have solved this problem by reducing the amount of colour agent. The other reason for press failure was that the coatings which were applied to the aluminium were thicker so we were having to remove huge amounts of coating. We needed to reduce the amount of coating but that reduces the run length of the plate. So we had to design more wear into the molecules left on the plate to compensate for this.”

McCullough adds: “We are very sensitive to contamination on press because we have technologies which we did not design it. However, this is not the case with this technology plate as proven by the 500 or so commercial sites we have using ThermalDirect and around 15 newspaper sites using the PP-N version.”

So do special inks have to be used or what happens if the ink manufacturer changes the ink ingredients?

“We do not require special inks on the press and we have not seen any ink problems,” replies McCullough. “The only problem we have seen is ink that has been left on the blanket wash. That can sometimes have an effect but that’s no different to any other plate. It is the tick of the ink, not so much the ink’s ingredients, which is the problem. We give you a tack value range which you can adjust but what we can tell you is that we have never had any problems with any customer nor have we had any press contamination problems.”

The advantage newspapers have compared to a sheet-fed process is that they can do that on a heatset press while at one unique site on a Sunday press the plate went to punch benders but not at the moment by densitometers.

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“What really surprised us is that it also worked with gelatin ink. It did not take the image right off. So we decided to commercialise a newspaper version.”

“The longest runs currently being undertaken are around 90,000. But there is a limit to all that these smaller newspapers need to change in terms of press conditions on a coldset web, I think that the plate might make the newspaper flat.”

McCullough adds: “We have some customers who say one of the advantages of not having a processor, apart from the cost, is the fact that the time to make a press ready plate is quicker, since there is no processing time. In fact, we have some sites which are using the PP-N plate as a back-up to ThermalNews Gold. So, when there is a problem with an edition, they can quickly put a new PP-N plate on the press and the press does not use it. Since we have seen a dramatic uptake of the other plate. They use the same ink settings, water balance, etc. etc., they have actually been equal so if they had 100 make-ready plates, they have compared to a sheet-fed process.”

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“With the Osteen Publishing Company in Sumter, we took ThermalDirect to a handful of small to mid-sized community newspapers in North America to test it and it worked.”

US moves to develop-on-press plates

MOUNT Vernon News, as part of its move to ctp, is to install a Kodak TrenderSet News 50 platesetter on which it will image Kodak’s PP-N develop-on-press plate in addition to providing 70,000 copies of its daily newspaper, it also prints a 27,000 circulation weekly shopper and various commercial jobs.

“Saving money ultimately was the main reason we decided to go with a press-on-press plate as proven by the image quality,” says Rundle.

Since the money savings have been so significant we decided to go with an all plate-on-press operation,” explains Liz Lutwick, assistant publisher at the newspaper. “The Kodak non-process plates have performed extremely well on our press and the Kodak sales team has been great to work with as we have moved through this process.”

Other American newspapers which use the plate include the Osteen Publishing Company in Sumter.