# *Advancing Flexography:*
## The Technical Path Forward

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As the countdown to DRUPA 2012 begins, participants throughout the flexographic packaging industry are anticipating the new technologies and processes that may become available in the near future. With that in mind, DuPont Packaging Graphics takes a moment to reflect on the current state of prepress for flexographic packaging and clearly chart our path forward.

## It's A Digital World

When DuPont introduced the DuPont™ Cyrel® Digital Imager (CDI), the first digital Cyrel® plate, and a fully digital prepress workflow at DRUPA '95, it could be argued that this was the single most important innovation in flexo prepress since the introduction of the first Cyrel® photopolymer printing plate in 1974. Like gravure and offset lithography, flexography could now move away from film based prepress workflows and implement a distributed digital workflow with a computer-to-plate (CTP) output that would allow design and production files to be easily shared by brand owners, tradeshops, and printers. Then, once approved, these files could go direct to plate.

The CTP approach chosen by DuPont was to apply a thin masking layer – referred to as a laser ablation mask or LAMs layer – directly to the surface of the digital Cyrel® plate during the plate manufacturing process. The LAMs coated digital Cyrel® plate was then laser imaged in the CDI, followed by the same exposure and processing steps that were already in place for film-based (analog) platemaking. This approach ensured uniformity of the LAMs layer and simplified the subsequent imaging and platemaking process-of-use for the tradeshop or printer-converters.

Since the LAMs layer was an integral part of the digital Cyrel® plate, the digital workflow also had the unique benefit of eliminating the need to perform the main UV exposure under vacuum. Plate waste and lost labor due to out of contact spots or dust were dramatically reduced, and most importantly, a new digital dot resulted from the fact that we could now expose the plate in the presence of oxygen.

The digital dot proved hugely beneficial to flexography. It was capable of increased resolution on both graphics and linework with improved reverses and extended tonal range. On press the digital plates and sleeves produced cleaner highlights, more open shadows, lower dot gain, and greater latitude than their analog predecessors. This was truly a step-change in flexo print quality.

Of equal or perhaps even greater importance was the consistency that digital plates brought to flexo. The uniform imaging of the CDI and the elimination of the variables associated with films and vacuum resulted in remarkably consistent platemaking and plate performance on press. From job to job, run to run and throughout a long run, digital plates demonstrated a consistency, repeatability and quality that allowed flexo to level the playing field with offset and gravure.

Today the fully digital workflow and digital dot have been embraced within all of the flexographic packaging segments. The conversion from analog to digital is nearly complete in much of Europe and North America, and well underway in the rest of the world. As evidence, 2010 was the biggest year yet for sales of new CDI's. Clearly the industry has recognized the quality and productivity benefits of the digital dot.

## Not Standing Still

Although the introduction of digital Cyrel® brought a dramatic improvement in quality and productivity to flexo, neither the industry nor DuPont stood still in the continuing effort to raise the bar.

The introduction of the thermal process Cyrel® FAST platemaking workflow in 2001 brought rapid-access platemaking to a packaging industry where every minute counts. The quality of the digital Cyrel® FAST plates proved to be excellent and the elimination of solvents or the need for a drying step cut plate processing time down to as little as a half hour. In addition, the elimination of solvents, the reduced energy consumption and the ability to recover spent developer rolls significantly reduced the carbon footprint of flexo platemaking, allowing users to show a sustainability commitment to their customers.

The higher resolution capabilities of the CDI demanded higher resolution digital plates, and DuPont responded with DPR for the solvent process workflow and DFQ for the Cyrel® FAST workflow. These higher durometer plates demonstrated outstanding resolution and long run length, and quickly became the reference standards in their respective areas.

More recently, EskoArtworks - the manufacturer of the CDI - also helped raise the quality bar with the introduction of HD Flexo II. The outstanding detail achievable with the 4000 DPI optics and the enhanced highlights and improved solid ink density enabled by their enhanced screening capabilities allows customers to increase the quality capabilities within their existing workflows.

Going forward, DuPont recognizes that there is a significant and growing demand for higher solid ink densities than can be routinely achieved using today's plates, and has embarked on an all out effort to develop next generation digital Cyrel® plates for both solvent and FAST workflows. These plates will be designed to achieve higher solid ink density while maintaining high resolution, low dot gain and excellent run length. The R & D program is well underway, and the expectation is that we will introduce the next generation digital plate at DRUPA, along with several other exciting new technologies.

## Alternative Workflows

In 2008 DuPont introduced Cyrel® DigiCorr; the modified digital workflow specifically designed for the needs of the corrugated market. DigiCorr was an exposure unit modification that allowed the main exposure of the digital Cyrel® plates to take place in an inert or oxygen free atmosphere, resulting in a hybrid digital dot with flat tops and broad shoulders similar to those produced on analog plates. These hybrid dots proved to be ideal for handling the caliper and compression variations typically found in corrugated board. It was now possible to incorporate all of the production advantages of a digital workflow and the quality advantages of digital Cyrel® plates while retaining the reduced fluting and excellent ink coverage that has made Cyrel® TDR the standard of quality in the corrugated market. The Cyrel® DigiCorr technology was recognized by the FPPA as Technical Innovation of the Year in early 2010.

The success of the hybrid DigiCorr dot and the introduction of the flat-topped dot workflows from other plate manufacturers logically raised the question about the suitability of a flat-topped digital dot outside the corrugated segment. With this question in mind, DuPont established the Cyrel® XD program; an extensive research undertaking to determine if there were any benefits associated with flat-topped dots in flexo packaging segments other than corrugated. Over a period of twelve months, extensive testing with a variety of plate, press, ink and substrate combinations failed to demonstrate any consistent advantage for the flat-topped dot versus the conventional digital dot. While some printers may benefit from a flat topped dot most found the best print results with a conventional digital dot. As you would expect in a process as varied as flexography, there is no one solution that satisfies every need.

Although the flat-topped dot does not appear to offer many consistent benefits outside the corrugated segment, one of the other attributes of plate exposure in an inert (oxygen free) environment – in addition to a flat-topped dot - is the ability to maintain exact 1:1 reproduction of the information that has been imaged onto the LAMs layer in the underlying plate. Although the inert atmosphere halts the natural dot sharpening that happens in the presence of oxygen – an advantage that has proven so beneficial in terms of quality and consistency - it does introduce the opportunity to perform "structuring" or "screening of solids". When screening solids in the digital workflow, the CDI images a very high line count screened pattern in all solid areas, creating a series of small cells that act to carry more ink on the plate surface; resulting in improved uniformity and increased solid ink density of the printed result.

Since there may be benefits beyond corrugated, and recognizing the inherent flexibility of the Cyrel® DigiCorr technology, DuPont has decided to broaden the offering and will be introducing Cyrel® DigiFlow. This relatively simple and inexpensive modification to the existing line of DuPont exposure units adds a chamber that allows for the creation of an inert atmosphere during main exposure by flooding the plate with nitrogen when flat-topped dots or solid screening are needed. The Cyrel® DigiFlow exposure units are designed for use on an 'as-needed' basis, and can easily be switched off when the standard digital dot is the preferred result. Because of the low cost and ready availability of bottled nitrogen and the flexibility of Cyrel® DigiFlow, DuPont believes that is the simplest and most cost-effective solution for those flexographers desiring the ability to seamlessly switch between standard and flat-topped digital dots. The Cyrel® DigiFlow offering is beginning the process of commercialization now.

## The Packaging Industry Today

Flexo has made tremendous technical advances in the last fifteen years which has allowed it to grow to the point where it is the most popular package printing process in many segments throughout the world. High quality flexo printing is now the norm - rather than the exception - around the world, and although continued improvement in print quality is still important to flexographers, it is no longer the urgent need it once was. Flexo quality is fully competitive.

Cost, however, is becoming more of a critical concern for many printer-converters. Increased global competition, the continuing consolidation of the packaging value chain and the recent economic slow-down, have all had an impact on printer-converter profitability. This reduction in profitability has caused many flexo printer-converters to identify the improvement of productivity and reduction in their total cost to produce as their highest priority, and there has been a surge of investment in high speed, quick change sleeve presses as a result.

Brand owners are also looking to take out cost, and one of their primary tools has been a significant reduction in packaging inventories. By reducing inventories, they have less working capital tied up and maintain the option to revise graphics on very short notice. As a result of this focus on minimum inventories, it is not uncommon for the same job to go back to press at least five to ten times between graphics changes.

DuPont™ Cyrel® round and Cyrel® FAST round can satisfy the needs of both the printer-converter and the brand owner. By replacing flat plates with Cyrel® round or Cyrel® FAST round sleeves, printers are able to take full advantage of the automation and quick changeover capabilities of today's state-of-the-art flexo presses. In addition, the excellent caliper uniformity of Cyrel® round and Cyrel® FAST round sleeves means that printers can run at the highest possible speeds. Finally, the perfect register and outstanding tone and linework reproduction that is possible when imaging and processing in-the-round takes flexo to the next level in quality and productivity.

Cyrel® round and Cyrel® FAST round sleeves also enhance flexo's competitive position versus gravure. The same caliper uniformity that allows high press speed also means that sleeves can run with minimum impression, resulting in sleeve life that can equal or even exceed that of gravure cylinders, permitting brand owners to benefit from flexo's lower overall cost to produce and faster time to shelf.

DuPont is committed to making a round workflow readily available to all who may benefit. The Cyrel® FAST round sleeve processing system was introduced in 2010, and installations of this unique just-in-time sleeve processing system are underway in Europe and North America. In addition to the original European manufacturing site, DuPont is in the process of starting up a Cyrel® round and Cyrel® FAST round manufacturing site in the U.S. Finally, DuPont is working closely with key industry players such as EskoArtwork and Inometa to ensure that a complete round digital workflow is fully supported in both prepress and the pressroom.

## Going Forward

The successful introduction of a complete Cyrel® round workflow solution is a key objective of DuPont Packaging Graphics in 2011, and enormous resources are being applied to ensure that this critically important quality and productivity solution is well established.

However, the introduction of new and innovative products and services does not end with Cyrel® round. As we said at the start, DRUPA is coming soon, and it's important for you to gain an understanding of our technical direction so that you can begin to determine what best satisfies the needs of your business.

- At 2012 DRUPA, you can look forward to the next generation digital plate for both solvent and FAST workflow. In addition to continuing improvement in the areas of resolution, run length and press latitude, you can look forward to a step-change increase in solid ink density and uniformity.

- We will introduce the next generation FAST processing system. For 2012 DuPont will be introducing a FAST processor that has been re-designed from the ground up to provide superior processing and clean-out, smoother and more consistent plate floors, and unequaled dimensional stability. The next generation Cyrel® FAST system will initially be introduced in a 52x80 format ; allowing customers that were previously constrained by the 42x60 size to take a fresh look at this system.

- Plate processing no longer needs to be a 'stand-alone' operation. The next generation Cyrel® FAST system will be able to operate within a fully integrated and automated flexo prepress workflow.

- You will see an expanded Cyrel® round and Cyrel® FAST round offering including new sleeve handling tools and enhanced sleeve mounting capabilities.

For over thirty five years the goal of DuPont has been to continue Advancing Flexography, and we are just as committed to that objective today, as we were when we first introduced Cyrel® flexographic plates in 1974.