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Technical & Marketing Information Release for Partners

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Dear partners,

Thanks to all of you, we have gathered very informative data including affirmative market responses and some barriers in the market with various reasons.

This report is prepared to inform you of the recommended market approaches and let you have the right understanding of the product to compete with others or persuade customers in effective way.

MARKETING INFORMATION

1. Market Overview

The year in prepress has been marked by the continuing battle in digital workflow with the latest PDF-based applications, argues between the violet camp and the thermal for platesetters, and slow progress of JDF. There surely have been the incremental improvements in digital working and attendant developments in automation. The problem is only going to become more acute as workflows become even more automated and complex. The idea of offering a digital asset management service has more appeal. However, many of the applications on the market are too expensive and complicated for any repro house to invest in.

Through the long history of prepress industry, the market has been very saturated with so many solutions and complicated product suites from large solution companies which have been leading the market. There's no doubt that relatively lower level of service providers in prepress and offset printing market will be the only possible factor of expand the market, rather than high-end users which most of solution companies are focusing on. However, it looks very hard for the current solutions to meet the demand of the middle and low end users due to the high cost and complicated structure of the product. Actually it is not easy to find the right practical and cost-effective solution in this market sector.

Dot-proofing or real dot technology has been introduced to the market for 2 years. Unfortunately, some successful products has secured their brand name in the market, without enough revenue over their investment so far. The problem we found in the market is that people are misunderstanding the dot-proofing technology, mainly due to The misleading of solution providers. Dot-proofing is conceptually one of the simplest solution in prepress industry, so as to let the middle and low end users understand easily and get the most expectable prompt result by trial. However the concept has been mixed with complicated workflow solutions and color matching solutions, with making people feel that the dot-proofing is very difficult technology and must be very expensive.

2. Market Approach of VisualDot

Whether they are newspaper, packaging, or general commercial printers, they all want—and deserve—the best quality that their investment can deliver. It is true that dot proofing technology can provide at least superior quality to the quality of existing continuous color proofing solutions in theory, regardless of minor difference in quality between a few dot proofing solutions in the market. Because screen representation in the proof will show more press-look colors and more accurate drawing of narrow lines and small fonts as its size on the press.

However, this is valid while we can assume that the know-how of current continuous color proofing can be maintained. If one user has been used EFI color proofing solution and another is very familiar with Oris solution for many years, can we expect they'll show the same performance when they use another totally different proofing solution? It could be, but there should be significant efforts and costly trials and errors in addition to basic expenses for adopting new solution.

All of dot-proofing solutions in the market have been developed with or beyond their own color proofing technology and users are forced to change their own existing (and very familiar) color proofing solution into the new one when they adopt dot-proofing technology on their contract proof works.

We should say that it is nonsense to let users take the risk of losing their accumulated knowledge and know-how with their existing solution, without regarding the cost they should pay for the same feature of existing one. They'll be glad to pay for only additional feature of dot-proofing if any, and VisualDot is the exact solution for this requirement, because VisualDot is the only dot-proofing solution which is independent to any of color proofing solutions. This remarkable feature of independency, flexibility and compatibility will open the real market of dot proofing.

3. Target Market Segment of VisualDot

Our competitors like EFI Screenproof, Blackmagic and Starproof are targeting high-end market with their expensive pricing policy and complicated product concept. This may work on the top of pyramid of the market, if a dealer provide a total solution including workflow solution, when the cost of dot-proofing itself is not so sensitive within the huge lump sum cost of total solution including hardware and workflow solutions.

VisualDot can work in this high-end section too, due to its flexible structure and independency. However, there's much wider expanding market in small and middle repro houses and design houses in offset printing industry. Color proofing solution is essential part for them and they will find no reason to change their existing color proofing solution and small workflow, only for adopting the new dot-proofing technology. VisualDot can be provided to them as an additional module to be simply combined with their existing solution with acceptable cost and minimum of risk.

This sector of the market looks the place where other 'heavy' dot-proofing solutions cannot approach easily and VisualDot is regarded as the only practical solution to meet the real demand of customers.

4. New market creation VS Cross / up selling

Marketers will find difficulties every time they'd like to create a new market with the new technology. Just like the initial stage of market creation of other new technologies, dot-proofing technology has also been introduced to high-end market where is always a demand of new and expensive technology.

But the truth is that the market for dot-proofing is not a new market but an existing market. Some evaluators asked us that VisualDot cannot print to proofers directly so it requires additional Rip software with the additional cost. This can be true in some view point, however, this is a kindly controversy between egg and chicken.

If there's any customers who'd like to adopt dot-proofing technology, in 99% of the cases they have their own existing color proofing rip software. It is a kind of misunderstanding of the real market if you say you're going to propose VisualDot plus new proofing rip software. In very rare cases that customers require VisualDot and new proofing rip software together, our partners can select any kind of Rip solution they feel confident and they can support easily. Also we have our own TOPAZ Rip software, which can drive Epson variable dot and diluted ink technology perfectly.

Anyway, the closer concept to the real practical field is that VisualDot can be added to any existing Rip rather than VisualDot require additional new Rip. If you understand the right concept of VisualDot, you'll find much wider market and its easiness as well as flexibility you have with VisualDot to approach the market.

5. Referring to Japanese market, which is regarded as 20~25% of world-wide market

Dot-proofing is very interesting solution in Japanese prepress market too. Currently Starproof and Blackmagic are selling in the market now. Approximately 200 copies of Starproof has been sold for 2.5 years now as a leading product. VisualDot was introduced into the Japanese market with the starting of year 2005. We made many press releases recently and VisualDot is selling more than Starproof currently. Without doubt, it seems to take the leading position very soon. This successful record is secured though only 3 months of promotion. EFI, GMG, Oris and CGS have their own dot-proofing module but they does not look successful in the market. As far as referring to Japanese market, there're only VisualDot and Starproof which showing meaningful numbers of real sales.

Japanese market is one of the most conservative market in the world. But Japanese market is one of the most practical market at the same time. Many dealers who have been treating with color proofing rip like EFI, GMG, Oris, Brother and CGS are adopting VisualDot due to its cost-effectiveness and flexibility. They're successfully applying the concept of add-on product in the existing marketing channel and customers in their marketing of VisualDot now.

There're some similar OEM products bundled with CTP workflows which is confusing customers. But most of them are just 'halftone simulator', not 'dot for dot proofing solution'. In the real market, there're just a few products that are recording meaningful number of sales; Starproof, Blackmagic and VisualDot. The optional modules of color proofing rip software has its own limitations and some of them are using 3rd party technology with their brand name. One of those are evaluating VisualDot to try to adopt our technology as a module of their product suite.

Please refer to the promotions and news releases in the major printing newspapers in Japan, attached with this document. We believe this reference practice can help our partners apply their creative idea in their local market.

TECHNICAL INFORMATION

6. The Demand of Dot-proof (Halftone-proof or Screen-proof)

One of the great controversies plaguing the printing industry is the argument over halftone proofs and whether they are truly needed. On the one hand, you have those who say they don't need halftone proofs: "Why should I? Since I am already getting color approval, all I need is a proof that shows how the color will print." On the other hand, you have those who swear by the halftone proof, claiming they need to be able to predict moiré. "I don't want the client to see an image that is smoother and more detailed than what I can achieve on press," they say.

Most inkjet proofers use error diffused or frequency-modulation technology. The advantage of this is that it produces a smooth, continuous-tone quality. The disadvantage is that this does not replicate halftone screens. Color management systems (CMS) complicate the issue. When remapping the inkjet color gamut, CMS uses additional dots to match the printing press gamut. This is especially true with six-color proofers. While six colors provide a much wider spectrum for matching special colors and different types of presses, it adds colors that are not present in the CMYK rosette.

Luckily, inkjet technology has come a long way. With the right screening technology, and a proofer that can print 1440 x 1440 dpi, dot-for-dot halftone reproduction becomes a reality. It is even possible to achieve dot simulation at 720 dpi, which is sufficient for predicting certain types of moiré. Although dot simulation is not an exact representation of the halftone rosette, it more closely represents how the final printed sheet will appear. It can also predict two types of moiré—color moiré, which results from incorrect screen angles, and subject moiré, which is the result of a complex pattern such as a checkered print interfering with the halftone screen.

Dot-for-dot halftone proofs print the details of the screening structure exactly as it will appear on press. The rosette patterns are identical, so all types of moiré effect can be accurately predicted. The individual dots on the proof have the same shape, size and color. In addition to a resolution of 1440 dpi to recreate an exact rosette, a proofer must be able to handle multi-density inks and produce ink drops of no more than five picolitres. Furthermore, the RIP must generate the same screen rulings and angles, and interpolate the data in exactly the same way as the platesetter RIP.

7. Dot simulation VS Dot for Dot

Simulating the dot

Screening technologies developed specifically for inkjet systems can mimic the rosette pattern sufficiently to detect both color and subject moiré under a loupe however you will not see an exact rosette as it will print. But it is a compromise worth making. Not only will you be able to detect moiré but you will have a proof that provides the look and feel of the final printed press output.

Dot-for-dot

Although dot simulation will cover most requirements for halftone proofs, there may be times when exact reproduction of individual dots is necessary. Dot-for-dot halftone proofs reproduce the screening structure exactly as they will later appear in the print version. The rosette patterns are identical, and so all types of moiré effect can be accurately predicted. The individual dots on the proof have the same shape, size and color, so you can see when dots are too small to appear on the printing press.

Dot-for-dot proofs, however, place very high demands on the proofing system. To start with, the system must be capable of resolutions of at least 1,440 dpi. It must also be able to handle multi-density inks, and to produce ink drops of not more than 5 picolitres. Furthermore, the raster image processor must generate the same screen rulings and angles, and interpolate the data in exactly the same way as the platesetter RIP.

For general offset printing dot simulation is certainly adequate. But it is good to know that as technology continues to improve, we will be able to shorten the route to total quality control and higher quality reproduction.

8. Benefits of Dot-proofing

The only problem is that most use screening technologies which are not really screens at all. At least not as we know them in the offset world, i.e. lines per inch. Instead they use techniques known as dithering, error diffusion or frequency modulation. The benefit of these processes is that they produce a smooth continuous-tone quality and work well with color management to produce accurate color. The problem is that they mask the many imperfections of the four-color process.

Even there's the same color saturation value between continuous color proof and dot proof, human eyes will feel colors on dot proof are much more similar to the press color, due to the existence of screen patterns.

One of the benefit from dot-proofing is known as 'Detecting moiré'.

One of the most notorious of the "process" imperfections is moiré and this happens when the four-color screen angles misalign. The result is that unpleasant wavy pattern we all know so well. This is called a screen or color moiré. Then we have what is known as subject moiré. This happens when a busy pattern in an image, such as a checkered fabric, interferes with or complicates the screen angles.

For advertising proofs, you usually want the best color match. But for overall quality control, you should be proofing with the same file that will image the printing plate.

Luckily, inkjet technology has come a long way. At a resolution of 720 dots per inch and using screening software, an inkjet proofer is capable of reproducing a halftone screen at 85 or 100 lpi.

As many of dot-proofing solution providers are promoting, dot-proofing is said to be able provide 200 lpi proof with 720 dpi proofers. This means a single cell which can present 257 gradation levels at 3200 original DPI will be limited to 3.6X3.6 (about 14) gradation levels. VisualDot is overcoming this limitation with using 8 bit conversion and HIFI inkjet technology like variable dots and diluted inks, but the shape of dots with limited number of inkjet droplet spots cannot be said to perfectly predict 100% of moiré in this case. Dot-proofing technology is not a kind of magic and it is depending on the performance of proofer machines. In this regards, you'd better regard the purpose of dot proof as 'to more press-look proof output' rather than 'to predict moiré of press perfectly', when you're creating dot-proof of 200 lpi at 720 DPI.

Another reason for the limitation in detecting moiré with dot proof is the existence of additional color spots in inkjet proof. Inkjet inks have a much wider color gamut than offset inks. So the system's color management software re-maps the inkjet gamut to match the offset gamut, blending the colors accordingly. As a result, it adds dots that are not normally present in the CMYK rosette. This is especially true with six-color proofers. While six colors provide an even wider spectrum for matching special colors and different presses, they add more dots to achieve the right blend.

In summary, theoretically it is impossible to create the same look of press with lower resolution inkjet proof.

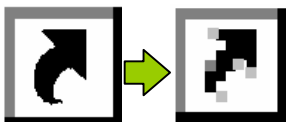
But we can create as similar look of press as possible with using dot proof technology.

This means, customers will get the proof output, at least better and more accurate than continuous color proof output. You'll find the difference in colors and details by simple adoption of VisualDot module into the current proof workflow.

9. Softness VS Sharpness of Dots in Dot-proof

In the basic theory of Dot proofing can be regarded as softening the real dots for inkjet spots moderately.

You can imagine the situation in designing small desktop icon image.



Under the limitation of pixels, we need to add diluted color to soften the edges and smooth curves.

We do the similar work so called anti-aliasing for designing fonts.

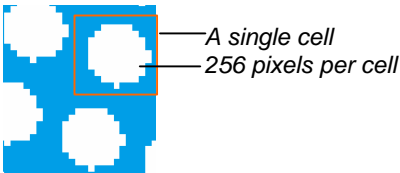
If we do not soften the image in the unit cell when creating dot-proofing image, we'll lose the original shape of dots and that might generate strange moiré-look patterns in result, which will not be shown in the final press output.

It is very important to understand that "the hardest or sharpest dot" which people easily expects from dot-proof is not always good for dot-proof itself. The sharpness or hardness of dots should be optimized to a certain level, enough to predict the moiré in final press. Each dot need not as that sharp as real press output.

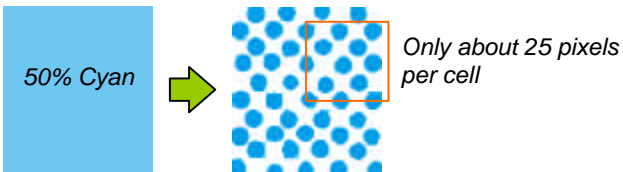
10. Inside the Dot-proofing technology

It is better to explain the real processes of dot-proofing technology, to understand what we can exactly expect from dot-proofing, because it is not a magic.

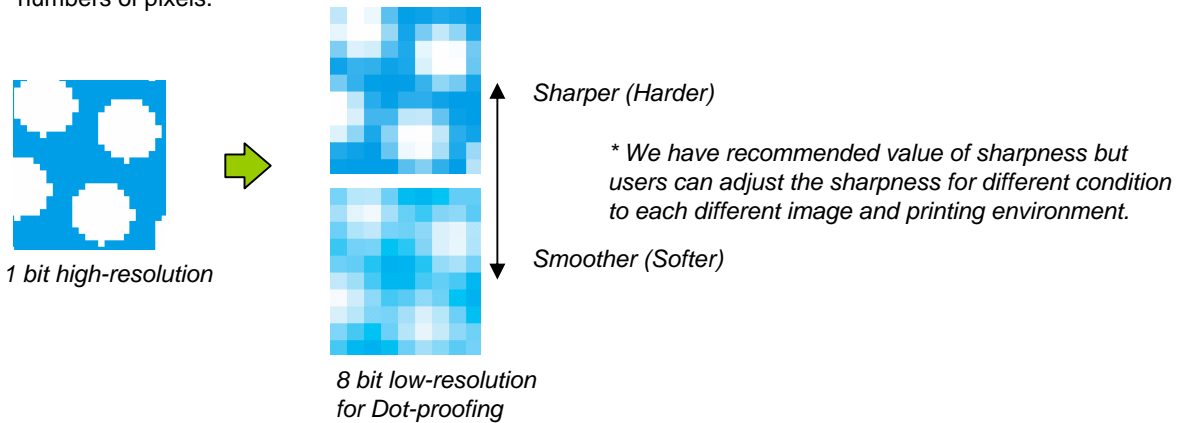
Let's say that we have C, M, Y, K images in 1 bit TIFF, in 150 lpi at 2400 dpi for the press print.
A close look of 50% Cyan area in the image will have 16 by 16 pixels per cell to generate 257 level of gradation.



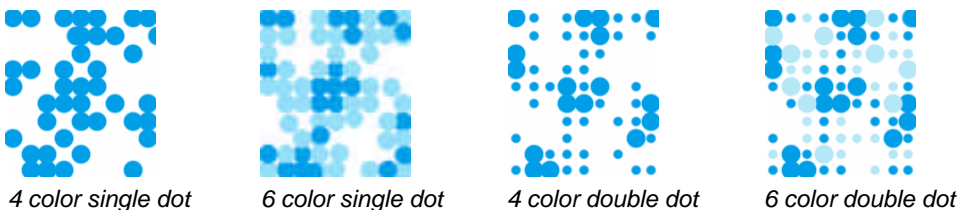
For inkjet printing, we need to down-sample the image into lower resolution, e.g. 720 dpi.
In this case, we have approximately only 5 by 5 (actually 4.8) pixels in a cell. This means we have only about 25 points per cell where we can drop the inkjet spot.
Under the continuous color proofing, only 50% cyan information will be contained in the cell with ignoring the screen dots and the proof print output with inkjet spots will be like the below image.



For dot-proofing under the same condition of continuous color proofing, we need to mimic the hard dots of original image under high resolution into the limited pixels of lower resolution cell.
However, when we use 8 bit gradation per each color instead of 1 bit, we can get similar shape of dots under the limited numbers of pixels.



In the stage of dropping the droplet of inkjet proofer, there could be different results due to each different option which user can select. We recommend to use supercell technology of Epson, which is using the smallest droplets. Or you can use variable dots of Epson, HP and Canon. You can also use light colors to add more dots, but this may make the colors of proof different from press. In summary, you need to use supercell/variable dot option, together with light colors if possible. In this case, you are recommended to set 'screen' option as 'none' (If there's no option to ignore the screen, you can select 'error diffusion'), and you should not use 'anti-aliasing' option, which can distort the screen dots.



Q&A for VisualDot

11. Dot looks too soft in VisualDot

As described previously, Dot sharpness is controllable parameter. However, it is very sensitive on the proof output. People are expecting as hard (sharp) dots as possible on inkjet proof too, just like the same look with press. However, if we making the dots sharper, unexpected moiré can come up or smooth shades can appear with steps in it. Currently VisualDot's default sharpness is optimized to provide the most acceptable quality in average over the various conditions due to different rip software's, proofer, papers and images. The sharpness value is somewhat optimized for Japanese customers currently, because they're the biggest customer right now. Even though we're providing some controllable range of the dot sharpness in the software, we're under development of more optimized algorithm in creating 8 bit dots and control tools for wider range of user's selection for it.

12. Automatic recognition of 1 bit TIFF file names is also required for SPOT layers

We agree with this requirement and we're under development of basic library of SPOT colors like Pantone index. If the SPOT layer is using the standard name of the library in the software, the file will be automatically recognized, and if the SPOT color is not defined in the library, you need to add the information by your self.

13. 2 SPOT colors are not sufficient

We'll provide unlimited rooms for SPOT color definition library and we'll let more than 2 SPOT color layers loaded in the software very soon.

14. Requirement of SPOT color conversion by user

Currently VisualDot is treating with SPOT colors by defining the color with RGB information and we convert it with other colors in CMYK format on the final output. But we totally understand what this requirement means.

We'll provide 2 options for users.

- User can define the SPOT color in RGB, CMYK or Pantone number.
All color layers will be merged into the CMYK dot-proof image as it is currently.
- User can define the SPOT color in RGB, CMYK or Pantone number but we'll not convert it.
Dot-proof images for all color layers will be separately generated in 8 bit TIFF (or PS or PDF) for each color.
User can combine them by the Rip software with their preferred color matching algorithm.

15. There's limitation in PDF output

Yes, that's right. Adobe distiller cannot open the image larger than A3 size.
Our PDF generation option need to be used for the size equal to or smaller than A3.

16. VisualDot is using another Rip software, so the screen of the Rip will spoil the Dots.

That's not true.

Without regarding the Rip software, the proofer machine is also using error diffusion dithering patterns. However, the screen is applied to the image when there's a change of size (down-sampling or up-sampling). If you create the Dot-proof image and rip/print the image at the same resolution, you need not worry about the problem.

17. Support of Opacity in Spot layers

In Japan and Korea, most of people do not use transparent SPOT colors. However, we're getting this requirement from some European customers currently. We'll put this option very soon without much effort.

18. Positive points in common

We found that our partners and customers generally agree with the listed positive points of VisualDot.

- Speed is impressive
- Hot-folder mode is very useful
- Interface for soft dot-proofing like zooming, panning and other analysis tools is user-friendly
- The structure is very flexible (compatible with any kind of 3rd party solutions)