

Current Trends in Virtual Proofing

A market analysis by



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Executive Summary

The production of printed goods accounts for more than \$70 billion annual revenue in the United States. With the introduction of personal computers and more specifically, with their use for “desktop publishing” in 1985, the workflow has evolved from a skilled labor-intensive *analog* process into a highly automated process through advances in digital technology.

By the end of 2005, practically every phase of the graphic arts workflow – from photographic capture to printing press output – has been automated through the use of desktop systems used by publishers, advertising agencies, and related creative sources, as well as the high-end digital systems associated with commercial printing.

But even with the rapid growth of digital technology across the printing industry, the production workflow is still hampered by the use of traditional hard-copy proofing processes.

Advances in LCD computer display technology have presented the potential opportunity for a truly “all-digital” production workflow, offering benefits for both printing companies and their print-buying customers.

Research Findings and Conclusion

Virtual proofing can improve upon the traditional proof approval process by offering speed, convenience and high quality within a truly all-digital workflow. Based on interviews conducted with some of this technology’s early adopters, the future of color proofing on computer displays seems “virtually” assured.

Some key highlights include:

- Virtual proofing is the last step towards an all-digital workflow.
- Time savings for the agency, publisher, and printer are significant.
- Improved quality can be obtained because all parties evaluate identical images.
- Distribution of digital files (for virtual proofing) is exceedingly faster than distribution of analog (hard-copy proofs).
- Customers can work collaboratively in real-time regardless of geographic location.

Background

The proof: Within the graphic arts industry, it is customary to provide an evaluation sample or “proof” of the final work. Photographers, agencies, designers, publishers, and printers all provide some form of proof including, but not limited to: “loose color” proofs (images only), “design” or “layout” proofs (i.e. what an ad will look like), “imposed proofs” (showing the location and position of all pages in document or publications), and “contract proofs” (a proof which serves as an agreement of expectation between the buyer and provider). These traditional on-paper proofs are referred to as “hard-copy” proofs.

Proofing Technologies

Press proofs: The earliest color proofing technologies were “press proofs” in which a short-run printing job was used to prepare the actual proofs. A major advantage of these proofs is that they were printed using the inks and paper to be used in the final printing job. Further, the four process colors could be printed in various progressive combinations (called “progs”) to help evaluate the components leading to the final results. Progs are rarely used today except for very special ink and paper combinations, and for special types of work that require this type of proof to be used for final evaluation.

Photomechanical proofs: By the early 1950’s several photomechanical proofing systems were developed to eliminate the costs associated with press proofs. The 3M “Matchprint”, DuPont “Chromalin”, and 3M “ColorKeys”, were among the popular systems that generated hard-copy proofs from the same film that was to be used for making offset plates. While less expensive than press proofs, these hand-made analog proofs were still time consuming and relatively expensive. Further, as agencies, publishers, retailers, and catalogers demanded more color images to be used in printed pieces, the need for less expensive proofing systems became more apparent. By the end of 2005, only a very small percentage of the market was still using photomechanical proofs.

Digital proofs: With the introduction of digital printing technologies including laser, dye-sublimation, and ink-jet, many moderate-priced proofing systems have been developed that offer significant cost reductions and availability to a broader market. The available technologies range from high-end, high-resolution devices capable of accurately rendering halftone dots from Kodak, Fuji, and Latran, to popular low-cost drop-on-demand inkjet printers from Epson, Hewlett-Packard, and Canon, as well as high-speed laser devices from Xerox and Canon. These digital proofing devices all generate physical proofs that must be considered “hard-copy,” since they cannot be transmitted electronically or digitally authenticated.

Virtual proofing: “Virtual proofing,” the latest development in proofing, is a *workflow solution* that is predicated on using a calibrated liquid crystal display (LCD) as the output device. In virtual proofing, the singular focus is the

assumption that if the LCD is properly adjusted (“calibrated”), any image viewed on it will be an accurate representation of how that image will look when printed. If, for example, the image appears too blue, the artist can make an adjustment based on what he or she sees with no further need to generate a hard-copy proof. Following *Axiom One* of plane geometry – *things equal to the same thing are equal to each other* – virtual proofing assumes that if each party viewing the display is looking at a like-calibrated display then: if the advertiser sees what the agency sees, and agency sees what the publisher sees, and the publisher sees what the printer sees, all will be in agreement with both the expectations and the final product.

Virtual Proofing System Components

Software applications: Virtual proofing software applications integrate the tools associated with color management with an asset server and a powerful database. For high-volume users, these systems track which parties have seen the proof along with the status of each viewer’s monitor calibration. These applications enable images to be viewed, marked up, comments added, and then transmitted to the next viewer. Currently, popular solutions include *Matchprint Virtual* from Kodak Polychrome Graphics (Kodak/Creo), *Remote Director* from Integrated Color Solutions (ICS), and Dalim’s *Dialogue*.

Viewing conditions: Viewing conditions for accurately evaluating hard-copy proofs and printed materials require the light’s spectral power distribution or “color temperature” to be set to a specific standard. (Color temperature is a scale predicated on the light emitted from a heated element and measured in Kelvins [degrees Celsius] named for English Scientist Lord Kelvin [William Thompson]. Measured in Kelvins, 5000° is comparable to midday sunlight and is used as the standard reference in the graphic arts industry in most parts of the world.) Print shops use 5000°K lamps over their work stations, and agencies and artists typically have small light booths fitted with 5000°K lamps. Since computer displays are self-illuminated and can be set to 5000°K, virtual proofing systems provide an internal means for providing a controlled viewing environment.

Calibration: While the latest generation of LCD displays offers greater stability and increased longevity over their cathode ray tube (CRT) counterparts, measuring devices known as “colorimeters” (monitor calibrators that measure red, green, and blue values) are still used to adjust and maintain the color and luminance output of the display. Hardware examples include the DataColor *ColorVision Spyder2*, X-Rite *MonacoOPTIX DTP94*, and the GretagMacbeth *Eye-One Display*. Software to control these devices is typically included but can also be purchased separately.

The Trend Towards Virtual Proofing

Even with great advances in hard-copy proofing technology since the early 1950’s, hard-copy proofing systems still require extensive materials handling as well as overnight

delivery services incurred at great expense to all participants in the graphic arts workflow. Today, an increasing number of printing companies and their customers have committed to exchanging proofs electronically, viewing and approving both color and content on calibrated computer displays. The lack of a tangible hard-copy proof in these environments has led to the use of the descriptive term “*virtual proofing*”.

Objective of the Study

With the assumption that virtual proofing represents a fundamental shift in proofing technologies, it is the objective of this study to gather information regarding:

1. What is the impact of virtual proofing technology throughout the workflow?
2. What are the benefits of using virtual proofing?
3. What are the advantages and disadvantages of virtual proofing compared to hard-copy proofing systems?
4. What are the obstacles to adopting and deploying virtual proofing technology?

To achieve these objectives, GrCI interviewed experts within the magazine publishing market segment. These organizations include the creative side (agency), the content provider (publisher), and various manufacturing organizations (printers).

Research Methods

The first research method used in this study was *Elite and Specialized Interviews*. Developed by communication expert Lewis A. Dexter, this method is used when interviewing people who are highly knowledgeable in a particular field and see themselves as experts or “elite” individuals. Rather than working from a prescribed list of questions, this method is based on a conversational approach out of which information relevant to the research flows. It is a particularly useful method to collect information on how people perceive or react to a technology. The interviews in this study were conducted by Brian Lawler and Hal Hinderliter.

The second research methodology used in this study was *content analysis*. Content analysis is a technique for the objective, systematic, and quantitative description of manifest language. Manifest language is the everyday or common language that people use to describe situations, ideas, thoughts, and experiences. In this report, content analysis was used to quantify subjective information gathered during the Elite and Specialized interviews, to identify, evaluate, and rate similar responses from multiple interviewees that were expressed through dissimilar examples, descriptions, and words.

The following case studies present direct quotes from the interviews conducted by GrCI's researchers.

Case Studies

Case Study A:

Leo Burnett Agency, Chicago, Illinois

Joe Duncan, VP of Print Innovation and Technology

The Leo Burnett advertising agency is headquartered in Chicago, but this communications powerhouse has offices and clients around the globe. A division of Publicis Groupe SA, Leo Burnett directs the creation of advertising campaigns for a diverse mixture of Fortune 500 corporations, urban markets and Spanish-speaking audiences. Designing magazine advertisements and commercial print projects for such a variety of locations worldwide can be challenging, but using an international mix of printing companies working with a variety of ink sets and color standards made consistent color almost impossible to attain - *until* Leo Burnett implemented virtual proofing.

According to Joe Duncan, Leo Burnett's VP of Print Innovation and Technology, enhancing the exchange of ideas is just one of virtual proofing's benefits. "Never has it been more important for an agency to tell a client how it's going to execute – instead of rich saturated colors on white stock, you're doing a better job of telling them how it's going to look. The benefits on international projects is gravy - it helps us communicate our vision within the local color space used by that print shop."

When compared to hard-copy proofing methods, Joe Duncan has found that a color-managed computer display provides both accuracy and flexibility. "We use SWOP for ads in publications, but we've been a little discouraged in the substrate changes," Duncan observed. "For our commercial print purposes, we're using a custom Leo Burnett profile which is slightly more saturated than SWOP. We're a print-centric organization and a couple of our clients are a little more demanding, so now we know that we can replicate the proof more accurately by working to a profiled house standard. We can get our suppliers to create a plate curve to meet our standards. If it's a printer that we don't do a lot of work with, we have to ask them to match our profile. We give them a starting point that will make for a better and easier make-ready. Eventually we'll get more particular about managing how close they need to run to that standard in order for their work to be acceptable."

Printing across borders is a challenge facing many multi-national businesses, but Leo Burnett's use of virtual proofing has reduced Joe Duncan's headaches. "For international markets, we do creative [work] here then they execute their collateral material in Europe through our office in Germany," said Duncan. "We use KPG's MatchPrint Virtual to coordinate the color, and they adapt our profile to their conditions. When you're talking

on the phone and each party is looking at their own hard proofs, cultural differences can really get in the way. How we communicate color is different in the US than in Germany, and different still in other parts of Europe – it was a hard thing to match color between our US and European production. Today, virtual proofing has allowed us to have a common starting point and a reference point on how color needs to appear through various stages of the process. It's better than our normal hard-copy workflow for accurately rendering substrates, metallics, etc.”

Duncan recalled a recent project that clearly benefited from the use of virtual proofing: “Recently we ran a 56 page catalog in Europe with proofs at press side, but prior to the press run all the rest of the job was communicated and executed through monitor proofing. The job wasn't an easy one, it had lots of neutrals and whites – but the client saved 1.5 weeks out of the normal production process due by eliminating the shipping of hard copy proofs.”

When asked how virtual proofing will continue to evolve and impact the workflow, Joe Duncan added, “We do believe in what [virtual proofing] has done for us, but there's still a long way to go to make it a transparent part of the process; from standards, to monitors, to education on what it can and can't do, bridging that cultural change. It has had a huge impact on our ability to accurately preview imagery.”

Case Study B:

Time Inc., New York

Kin Wah Lam, Director of Digital Development

Time, Inc. (a division of Time Warner) is one of the world's largest magazine publishers, boasting a collection of high-profile periodicals including Sports Illustrated, Money, People and In Style. To assure proper reproduction for ad layouts supplied by Time, Inc.'s customer base of international advertising agencies, Time, Inc. had traditionally received a physical contract proof with every supplied advertisement. Although transmission of artwork for these advertisements has been an all-digital process for many years, the reluctance of ad agencies to abandon hard-copy proofing kept Time, Inc. from obtaining full benefit from an otherwise efficient digital workflow. Recently, after several years of study and consideration, Time, Inc. has begun to eliminate the use of hard-copy proofing at many of its weekly and monthly publications.

Kin Wah Lam, Director of Digital Development for Time, Inc., is driving the adoption of virtual proofing among Time's print providers because of the clear advantages offered by this new workflow. “The virtual proofing will definitely cut down on all the manual trafficking of [analog] information,” states Lam. “Because the file is the proof, the file is the content - and the file is the final say. As soon as you introduce a hard proof that immediately pits one against the other in terms of which one is the right one or which one has the final say. That automatically adds more production time in the mix because there is no easy way for a file to be compared to a proof other than human intervention.”

Embracing change can be difficult, but Time, Inc.'s Kin Wah Lam has seen resistance turn to excitement. “In the beginning everybody was just as skeptical [about virtual

proofing] as everybody else,” Lam recalls. “The first thing they were guarding against is that monitor is never good enough for color. That was the first resistance. Then, they realized that the monitor is just as good as the contract proof. Then it was not a technology issue in terms of color science, but it was the workflow. That had a bigger bearing on the adoption of virtual proofing to the whole chain of the workflow. From traffic people to people that are proofing – all of a sudden what do you do when you don’t have a hard proof to reference or to physically touch?”

As Time, Inc.’s suppliers gradually let go of outdated procedures, Lam finds that common ground is easier to reach. “What we did say to advertising agencies was that they could continue to make a hard proof for their client if they need it,” says Lam. “So, make that hard proof, but at the point of delivering it to the publisher, that’s when we want you to stop. Meaning, don’t send us a hard proof. Make a hard proof for your client for approval so they can go home and sleep with it or whatever, but in the production process we are print professionals and we follow standards, so let’s make that chain completely digital. At that point, everybody understands and has agreed on in the agency world.”

Case Study C:
RR Donnelley, Torrance, California
Dave Welks, Quality Analyst

For print providers, the satisfaction of their customers is the only valid measure of success. As one of the world's largest printing companies, RR Donnelley often implements new technology to better serve its customers. Just as RR Donnelley pushed for innovation as an early adopter of computer-to-plate, digital proofing and automated workflows, it has recently installed the latest virtual proofing systems in several printing plants. While the adoption of any new equipment or processes can result in occasional frustrations, RR Donnelley’s press operators have overcome their initial concerns over the usability of virtual proofing in the pressroom.

Quality-minded printing companies like RR Donnelley insist that every new workflow must prove itself – but Dave Welks, Quality Analyst with RR Donnelley’s Torrance, California plant, says that virtual proofing has passed the test. “We did have some concerns over whether we could match ink-on-paper, reflective hard copy with an electronic monitor,” Welks admits. “However, after viewing this stuff, we can see that this is going to work. We really do expect this new technology to make things easier for us here in the pressroom, for sure. As well as for our customers with the cost savings of making proofs.”

Dave Welks notes that successful use of virtual proofing requires a properly maintained system: “One of the things that is crucial when [virtual] proofing is to maintain the system you have and to calibrate these monitors on a regular basis,” observes Welks. “Whether you’re using Creo, Kodak, or ICS, they all require you to calibrate these monitors every 24 hours. There’s actually a time stamping device in the system itself that actually tracks this.”

Evaluating color images on a computer display is simply the next step in the evolution of proofing, according to Welks. “When we first embraced this technology, we looked at past technologies that we used when viewing proofs,” he recalls. “We’ve had progressive proofs over the years, we’ve had Matchprints, we’ve had ColorKeys. Now, we’ve got new technology with electronic [virtual] proofs. Just like viewing any other kind of proof, there are little gray areas where it’s not exact, but you can get there. We feel that it is going to be a tool that can be used by all our customers. They could use this stuff at home. This is the future.”

Saving time in the pressroom is of interest to any printing company, and Welks finds that virtual proofing provides that benefit. “For the press guys, what’s going to happen is, now they are not going to go retrieve the green bag with their hard copy proofs” he explains, “they’re simply going to finish a job, go to the monitor and open up the file and, bam, they’re going to be there. They’re not going to have to sort the [proofs] out and lay them out, so [virtual proofing] should save the press guy’s time in achieving color and being able to look at their monitors.”

Differences between monitors, hard-copy proofs and press sheets are all relative as far as Welks is concerned. “There are some similarities between hard copy proofs and [virtual] proofing compared to the printed product,” Welks notes. “Obviously, when you’re working with a substrate with your printed product, and inks on paper, then you’re comparing that [result] to your photomechanical hard copy proofs. There’s always subtle differences too, depending on the substrate that was used to create that proof. Now, when you’re looking at a soft proofing monitor, there are certain profiles that go into that as well to capture either SCA papers or a gloss paper to better simulate the substrate that you’re going to be printing on. We know that we’re going to be able to work through that simply because we’re able to work through it on our hard copy proofs. So, any kind of subtle differences that we may see in the background on the soft proofing monitors and that we see on a reflective copy, we’ll be able to work through easily, either by changing a profile or – we’ll be able to tweak it or salt and pepper it, if you will, to our taste.”

High-end virtual proofing systems offer management of multiple proof iterations, a feature that Dave Welks finds compelling. “When a customer is viewing a file on the monitor at your workstation they can feel relatively sure if they’re sending the same file to the printer that they’re not losing anything during that translation,” he states. “One of the safeguards that’s in there is the fact that everybody’s using the [same] ICC profile. Customers are more apt to print with you now that you have this technology that’s going to ensure that their product is the same as it was on the file and you’re printing it to the same exact thing – nothing was lost there.”

Gary Wells, Prepress Technical Lead, (RR Donnelley, Torrence)

As an experienced operator in the prepress department of RR Donnelley’s Torrance plant, Gary Wells knows that customer demand is driving the adoption of virtual proofing. “Our virtual proofing testing has come about based on customer request,” says Wells. “We

have two major customers who comprise about 95 percent of our pages. Those customers both spend a great deal of money on paper proofs, so they've both been keenly interested in developing soft proofing here on press to eventually eliminate the cost of making paper proofs. In this division, because of those customers, we've started by testing three different competing products: a Kodak system, an ICS solution, and a Creo system. Each was installed in one prepress and press station. Our testing was to upload files to each one and test not only their press interface, but also their involvement in prepress - how much work it took to input files and manage files."

When using virtual proofing in a production environment, Gary Wells knows that the brightness of the computer display is key to the system's success. "One of the issues at press is getting the monitor brightness to match the brightness of the hard proof under the lights," Wells recounts. "We chose the Apple Cinema 23" because we really thought the Apples had a lot more visual brightness and you can really compare the colors a lot closer where as the Eizos you had to kind of squint and say 'Well if this was brighter, it would look like that.' Right now we're equipping all of our five presses with the Apples."

Matt Heinzinger, Pressroom Process Supervisor, (RR Donnelley, Torrance)

Customer satisfaction is the goal for Matt Heinzinger, Pressroom Process Supervisor at RR Donnelley's Torrance plant; he sees virtual proofing as a crucial strategy for meeting that goal. "At this point in time, we're doing it to meet our customer requirements," notes Heinzinger. "That's what's driving it, and it's going to drive it through the whole industry. So, you can be the leader of the industry or wait until everybody else has it and try to compete."

Heinzinger sees the adoption of virtual proofing as another step towards an all-digital technology-enhanced workflow. "Where is this going to lead us? I foresee it leading into recognizing what each individual press does," Heinzinger predicts. "Taking files. Doing color presets. Working directly with the CLC [closed loop color system]. I mean, that's my dream - to someday work with a CLC system, in that the files will someday be of the quality of a proof and the CLC will take readings and compare that to the files."

As part of the team that has implemented virtual proofing at the Torrance plant, Matt Heinzinger believes this new technology offers a competitive advantage for RR Donnelley. "I believe as Dave [Welks] does," Heinzinger concurs, "that having the technology will cause our customers to say '*These guys have it and we're going with them because they do.*' Quite often, we'll have different customers that come here on tours or they may have one job here, but they have a couple of other jobs and they hear about the technology and, almost every customer that I've talked to was very, very interested in it. I think that catalogers or retailers might be a little bit - I don't want to say reluctant, but maybe hesitant just because it's away from their paradigm. It's away from what they know. People are used to holding the hard proof in their hand, so you have to step back off that paradigm and realize that this is directly off your files. The files that go to the Trendsetters to make plates - that's what you're seeing right there."

Jim Frisch, Technology Manager , (RR Donnelley, Torrence)

As the Technology Manager for RR Donnelley's Torrance operations, Jim Frisch played an instrumental role in the adoption of virtual proofing. He sees this new process as beneficial for RR Donnelley's pressroom operations: "You have to understand that most of the press people's biggest complaint [regarding hard-copy proofing] has been that they would often get proofs that were not standard. So, from the press person's perspective it's actually a benefit. They are getting colors that are all in the same color space. They're not seeing different vendor's proofs showing up at the press at the same time and for that reason there is better continuity for the press person."

Frisch sees virtual proofing as an enabling tool for color management, which can drive better predictability on press. "If there are going to be benefits to the printer long term it's going to be because we can fingerprint the presses and the papers and provide that data as ICC profiles back to the client," states Frisch. "In that way we can provide the client with a realistic set of expectations and I think a lot of the cynicism that comes with starting off with a proof as a starting point and driving the press outside of its color gamut or trying to drive the press to a different creative level away from the proof is because we have, as an industry, developed this belief that the proofs don't accurately represent what is actually going to happen on press so there's a license to make changes on press. From a printer's perspective, that's costly. It's a waste of the client's paper and very often a waste of their time. So, I think there is going to be a long term benefit for us to give a good set of expectations up front."

The flexibility of virtual proofing is important to Frisch, who uses that capability to provide more accurate results. "We can actually tune the white point on the monitor, but more importantly we can mimic the white point of the paper on that monitor," Frisch explains. "Even more so, we can mimic on that monitor the wet trap of the ink and the color that comes from ink on ink. So, now we're getting to the point where a proof might not show the wet trap of a cyan and yellow as a green, but once we fingerprint the press and put the ICC profile together, we can accurately show that trap of cyan and yellow clear back to the client on their monitor and set expectations for the green that they see under those conditions reflects how ink is going to stick to ink on their paper."

Driving down costs for RR Donnelley's clients is a compelling motivation for Frisch. "I think there will be a saving for the clients because we'll have less run waste. We'll have less make ready waste. We'll have better throughput. There will be those instances where clients may want to move away from that color even though they've agreed to it – that's their prerogative – but we'll have an opportunity to set expectations early in the creative and the collaborative phase that are realistic," Frisch notes. "If we look at the number of high-end costly [hard-copy] proofs such as the Kodak Approvals or something of that nature versus the lower cost Epson's or inkjets clear down to the desktop inkjets, we see a trend there for clients to accept less and less quality in an attempt to save money. It is not the kind of overhead that the client wants to continue to pay for."

With multiple agency proofs arriving for each magazine run, Jim Frisch notes that it's been hard to discern how each advertiser's comments should be interpreted. "Very often – and this is a story that a lot of the publishers have told us – is that a large percentage of their product will come in marked up for color not for content," reveals Frisch. "Meaning that the file that was actually sent has changes to either verbiage or pictures, and the proofs that we received two days ago don't represent what we are printing. That's because of the sense of haste or the closing date that was issued, so there's another issue. What we get to image for the plate is, in fact what we're looking at for color, and that gives us a better level of confidence, and is another problem that is overcome by this [virtual proofing] technology."

The ability to trace a customer's approval back to a specific iteration of that proof is a powerful benefit of virtual proofing, according to Frisch: "The metadata that is collected by these systems is resident with the image and if it's disconnected – say, somebody opens that up in Photoshop and makes a change to it – and it is not reprocessed and agreed to by the client, then that tie is broken to that agreement."

RR Donnelley's prepress operations are leading the adoption of virtual proofing, but one characteristic of the Torrance plant is consistent with the rest of the global graphic arts industry: the computing platform of choice has been Apple's Macintosh. "The preferable operating system is Mac because some of the utilities around color and ColorSync and trying to stay as consistent with the kind of tools that the creative folks would use – Photoshop, Illustrator, Quark – I think there's that need to have a consistent platform."

Case Study D:

Williamson Printing, Dallas, Texas

Art Bush, Vice President of Color and Technical Sales Support

Dallas-based Williamson Printing is among the largest commercial printers in the United States, offering high-quality sheetfed and web offset printing to corporate clients across the US and abroad. After winning nearly every award available to printers, Williamson has earned the reputation of being picky about color. As one of the earliest users of a virtual proofing system, Williamson pushes the technological envelope for sound business reasons: greater efficiency and customer satisfaction.

Art Bush, Vice President of Color and Technical Sales Support, says that Williamson pushes the technological envelope for sound business reasons. "Well-respected printers always want to be on the leading edge, looking at new technology, always looking for ways to make the printed product better and more affordable," notes Bush. "It's a combination of wanting to do a better job, of wanting to communicate faster, to save money, but also learn by this technology and see how we can become better printers on top of that."

As an experienced color expert, Art Bush feels that virtual proofs provide a more consistent viewer experience. "With the monitors and today's technology everybody can be looking at the same color space – so it's very positive." Bush also notes the instantaneous nature of virtual proofing as an additional benefit, helping Williamson's

production staff stay on schedule. “We can increase the quality because now we have more time to finesse it. Before it was like we just had to get the job done because it took so long to make it happen.”

Compared to his experience with the first generation of virtual proofing systems, Art Bush is impressed by the ease-of-use offered by today’s products: “They’ve made soft proofing so simple; you don’t have to go online as soon as they send them,” explains Bush. “It comes in a folder and at their leisure they can pull that folder up and look at them just like if they opened up a packaged hard copy.”

Ted Atchley, Color Management Coordinator/Retoucher, (Williamson Printing)

In his hands-on role as Williamson Printing’s Color Management Coordinator/Retoucher, Ted Atchley sees the benefits of virtual proofing on a daily basis. “I think that the economics of the newer technologies is such a profound improvement for most people,” notes Atchley. “The fact that they don’t have to be on site to see a proof. They don’t have to wait overnight [to see] the color that they’re working on. The traditional way of doing prepress would have us make a proof. This proof would go out overnight to a customer. They would take the rest of the following day evaluating the color on the proof, marking it up, and physically put it in a package and send it back to us and then we’d get it the next day. So, basically we have, in the best case scenario, one round per day. We’ve had some really successful collaborations with customers where we’ve done as many as five or six iterations of color in just a couple of hours. So, the turnaround time is a profound change and the expense involved with physically shipping these proofs – nobody wants to pay the bills and they don’t want to wait for the proof to come in. So, you can do several corrections really rapidly and, along with having a running conversation with the customer, this highly subjective color exercise can be streamlined significantly.”

When asked to consider the long-term impact of using computer displays for color evaluation, Ted Atchley is bullish on virtual proofing. “I think it represents a big change in the way business is done in the printing industry,” Atchley observes, “and even though it’s been somewhat slow in developing, once again the economics of the situation are going to take over at some point. We feel like everyone will do business this way.”

As a service provider to major international corporations, Williamson Printing must always remain concerned about the security of its systems. Ted Atchley points out that virtual proofing offers both security and ease-of-use: “The software has gotten a lot more sophisticated at the development end and the end user has experienced a lot easier time in adopting it. Now there’s no special communication protocols involved with the signal coming into our building. The software has a proprietary encryption on the data going back and forth which provides a level of security for our customers and us, yet it goes through the pipeline very efficiently and quickly.

Virtual proofing allows Williamson to deliver an improved level of service to its widespread customer base, according to Ted Atchley. “With ICS Remote Director and virtual proofing, the turnaround times are very quick,” he notes. “It allows us to acquire

customers west coast to east coast that probably would be somewhat hesitant to do business with us for no other reason than the timely nature of the materials being passed to and from these offices. So, we think that it's going to enable us to acquire a new base of customers that don't reside in our area."

Results of the Study

1) Content Analysis

The research conducted for this project consisted of 10 interviews, portions of which were reproduced in the preceding paragraphs. A statistical analysis was conducted from transcriptions of these interviews, allowing 29 key concepts to be identified. These statements were then categorized within groups, based on the frequency with which each concept was mentioned. For example, the idea that *"Interest in virtual proofing stems from the desire to save time and money"* was the highest ranking concept, as a result of being referenced nine times within eight interviews.

The identified concepts were distributed into three classifications labeled "High Emphasis," "Average Emphasis," and "Low Emphasis." Seven concepts received four or more references and were classified as "High Emphasis," representing significant observations by industry professionals. Concepts receiving two or three references were considered to be observations with "Average Emphasis" in industry. Concepts receiving only one reference in the eight interviews were placed in the "Low Emphasis" category.

Content analysis performed by California Polytechnic State University graduate student Chris Riffel.

	Number of references
High Emphasis	
Interest in virtual proofing stems from the desire to save time and money.	9
Customers are demanding proofs made to approved standards, so they know the results will be accurate and repeatable.	5
As with any new technology, proper training is necessary on the part of the client as well as the printer.	5
Virtual proofing will continue to improve.	5
Virtual proofs facilitate global communication and make proofing at a distance more feasible, thereby expanding the number of customers a printer can service.	4
Virtual proofing and color management technologies allow	4

people to see the same color spaces on separate monitors.

Virtual proofing is about giving the customer an accurate and realistic set of expectations up front, before any printing is done. 4

Average Emphasis

Virtual proofing is the future. 3

Customers are beginning to demand that their printers use virtual proofing and color management technologies. 3

Printers and customers are excited about the future prospects for virtual proofing. 2

There is a demand for the technology. 2

The technology is ready; the issue is now to build customer confidence in its potential. 2

Accurate ICC profiles need to be used for each monitor and printer. 2

Virtual proofing primarily benefits the customer at this point, but in the future it should provide benefits for everyone. 2

Regular calibration of monitors is a necessity. 2

Low Emphasis

Clients aren't all convinced that virtual proofing is the best way to work, but many are beginning to think that way. 1

Stigmas surrounding the new technologies are starting to relax. 1

Some customers will invest in virtual proofing because they can visualize the future. 1

Once people get used to virtual proofing they will not want to go back to hard proofing. 1

Most printers aren't using the technology to its full potential yet, 1

but they plan on moving in that direction as soon as possible.

Customers believe that printers can match a monitor that has not been calibrated and that is unrealistic. 1

Virtual proofing vendors are moving toward standardization. 1

Many customers don't know that virtual proofing and color calibration are things that can be implemented. 1

Calibration allows for increased, accurate details that are otherwise unattainable. 1

The more the technologies are used, the better printers will get at implementing them and educating customers about the benefits. 1

LCDs have the ability to be more consistently accurate than CRTs. 1

Anyone can successfully implement the technologies with proper training. 1

Even the most discriminating customers are happy with virtual proofing results that have been properly color managed. 1

Virtual proofing has the ability to be 98-99% accurate. 1

2) General Evaluations

From the source material for this document (consisting of more than seven hours of interviews), and the nature of these responses, it is concluded that virtual proofing is an emerging technology of tremendous significance.

Market forces are demanding improved efficiency from every sector of the graphic arts industry. As one of the last vestiges of the traditional analog production process, hard-copy proofs are a costly tool that hinder productivity. Similarly, the distribution process associated with shipping and moving hard-copy proofs through the system is a waste of time. The need to drive costs down, and efficiencies up, is evident.

3) Benefits

Numerous benefits resulting from the use of virtual proofing were referenced by the interview subjects, including:

Consistency: Consistent color appearance of monitors means the numerous users involved in project, regardless of their geography, will be viewing the same thing.

Stability: Stability of LCD technology suggests that images will be represented more accurately over long periods of time.

Calibration: Since the colorimeters (calibration devices) are made to tight tolerances and are easy to use, it is suggestive of the idea that it is easier to calibrate multiple LCD displays, including those at remote sites, than it is to calibrate the color reproduction of a printing press to a hard-copy proofing device in the same location.

Reduced handling: The elimination of physical proofs will lead to reduced manpower for opening, logging, and routing these documents.

Distribution: By eliminating the shipment of a hard-copy proof, approval times can be dramatically shortened to remove days from the production cycle.

Collaboration: Multiple viewers can examine, offer comments, and annotate virtual proofs simultaneously.

Documentation: A virtual proofing system can automatically log all annotations and changes, and provide an automatic means for version control.

Duplicity: Virtual proofing systems can prevent the accidental duplication of proofs (eliminating the possibility that one might be the wrong version, as with analog proofs).

In-gamut proofs: Hard-copy digital proofs may exhibit out-of-gamut values that cannot be reproduced on press. Virtual proofs made on calibrated displays and color managed with accurate press profiles can only reproduce in-gamut values.

Compatibility: International and US production teams can color-manage their virtual proofs to account for differences in press reproduction (such as SWOP versus FOGRA27).

Expanded market potential: By allowing freedom from geographic restrictions, print providers are free to transact business almost anywhere within the global marketplace.

Accessibility: Email notifications, asset servers, and high-speed Internet access allows proofs to be quickly accessed, even on holidays or weekends.

Security: Virtual proofs can be encrypted during transmission, secured with a password, or even require a specific individual's security certificate before viewing.

Metadata: PDF workflows can automatically retain an enormous amount of hidden information on many aspects of the document's contents (author's name, photography credits, last modification date, and other important attributes). This information can be easily extracted from the virtual proof, but is lost during the creation of hard-copy proofs.

Automation: Embedded metadata can support workflow automation systems based on Job Description Format (JDF) ticketing.

Asset management server and software: While it is possible to engage in virtual proofing without an asset server (such as an email exchange of PDF files), there are many compelling reasons for the print service provider to store its “virtual proofs” on an Internet-accessible server. Convenience, secure log-ins and the ability to handle large files are among the benefits of hosting proofs on an asset management server.

4) Obstacles to Adoption

Accuracy: Concerns about the accuracy and reliability of computer displays still have to be realized and tested by those who have not yet used the technology.

Standards: Perhaps the greatest obstacle remaining to the widespread adoption of display-driven color evaluation is the lack of applicable internationally recognized standards. While the marketplace awaits the arrival of useful standards, those who foray into the world of virtual proofing would be well advised to test the compatibility of their hardware and software selections with those used by their clients and/or print service providers.

Participation and collaboration: Currently, most successful virtual proofing implementations occur between existing workflow partners, who encourage all participants to utilize a specific monitor, calibrator, profiling software and proofing evaluation system in order to achieve repeatable results.

Trend: While the industry is more accepting of new digital technologies than it was ten years ago, the early adopters are still in the minority.

Market awareness: To enact such sweeping changes in our established print manufacturing paradigm, virtual proofing must continue to offer a compelling selection of benefits that outweigh both the actual and perceived challenges.



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