

IPA Digital Print Forum 2009 - Procedures & protocols

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1. Introduction

In 2008, the IPA conducted the first Digital Print Forum where we reviewed digital production devices and compared these to the same images printed offset on a Heidelberg XL 105. The results were printed in a booklet and presented at the IPA Technical Conference in Chicago, April, 2008. We are now beginning to plan for 2009. We intend to have a bigger, better Digital Print Forum with more entrants, more tests and more data from suppliers.

An exciting development for 2009 is that the procedures and data gathered from the Digital Print Forum will form the basis for the development and implementation of a related IDEAlliance Digital Print Certification process that will be similar in nature to the existing IDEAlliance SWOP/GRACoL certifications for inkjet proofing and monitor soft proofing. The data determined in the Digital Print Forum 2008 and 2009 will be used by the IDEAlliance Print Properties Committee to guide the setting of tolerances for that process.

We salute the bravery of the suppliers that entered the inaugural 2008 survey. The outcome and the results were not known beforehand, and the format and presentation of the data was also unknown. In this environment we applaud those suppliers that participated. We learned many things from the 2008 Forum and will use these lessons to improve the 2009 Forum.

Please participate and become involved in the industry's most important study of digital production printing.

2. List of Supplier Systems

A list will summarize the details of each system studied in the Forum. The table will include the supplier name and the device/hardware name. The suppliers will be asked to provide an indicative selling price for a base configuration including RIP. The price should relate to the device used to produce the data in the report. The digital front end (DFE) that was driving the device will be listed, the paper used will be listed, and any relevant configuration options will be provided.

3. I am not ready to go public.....

Some suppliers may not be ready to participate in the Forum this year but may have a device that is in development and/or testing phase. There is no ability to use an anonymous code system, such as Supplier A1, Supplier B6, etc. Instead there is the ability to do the tests “offline”. In this format, suppliers provide their samples according to the mainstream test procedures, and their samples are measured and evaluated at the same time as all other entries. The data from these tests, however, will only be provided to the supplier and will not appear in the official published data. This process allows suppliers to see how they perform alongside all other systems. The process allows them to be measured and evaluated independently by a third-party and to have exactly the same equipment and test procedures applied to their samples. The cost to do this “offline” evaluation will be the same as the “public” testing. Those

systems submitted for "offline" testing are not eligible to be re-categorized as "online" and cannot be submitted for testing in the main Forum.

4. Do I have to enter all the tests?

If your device can perform a test, then yes, in the spirit of the investigation it is required that you submit entries for that test. Any given device cannot perform best in all categories and there are some categories in which there may be less than stellar results. This can be easily explained by, “we are not aiming for that market segment and have therefore not prioritized our functionality in that area.” When dealing with complex technologies this is an understandable and acceptable position.

If a supplier has a device that can perform a particular test, e.g. light fading, and the supplier refuses to produce the appropriate image for this test, then this will be reported in the published document. Wording that may be used could be “Supplier chose not to enter”, or “Data not provided by supplier – contact your local representative for further information.”

5. If a supplier refuses to participate?

Every major supplier will be contacted and invited to participate via repeated e-mail requests and phone calls. We will also make written invitations to participate. Attempts will be made to contact individuals at all levels within relevant organizations. If a supplier does not respond, in the interests of the digital print customer, we reserve the right to bypass the supplier and solicit entries directly from printers who are using the specific device we seek. This will be done at the discretion of the IPA and in the interest of the wider digital print community.

6. Cost to Supplier - \$xxx per System

There are numerous costs involved in the Forum. There are external costs for the testing, and there are other costs of shipping and handling. There are labor costs – to pay for measuring the press sheets and collating the data, and there are costs involved in binding and finishing for the final report. The final cost will depend on the range of tests that are finalized in this document.

The IPA does not seek to make a profit from the Forum as it is of educational value. The IPA seeks to inform our industry and seeks to promote digital printing. The charges being made only cover the real costs involved in this project.

- Each supplier will be charged \$xxx per system to enter.
- There will be a discount for more than one system entered.
- The cost of entry will enable a discount to the subsequent IDEAlliance Digital Press Certification process.

7. Timeline (Proposal)

2008

October 10 – *Procedures & Protocols* version 1 document to be published
October 17 – Conference call with all participants to review the draft document
October 29 – Face-to-face meeting at Graph Expo
November 10-11 - Print Properties Meeting, RIT, Rochester – discuss IDEAlliance certification
November 15 – Release version 2 of *Procedures & Protocols*
December 1 – Final - version 3 of *Procedures & Protocols* document to be published

2009

January 1 – deadline for suppliers to confirm systems for testing
January 31 – deadline for suppliers to submit proofs
February 20 – testing and evaluation to be completed, final report presented
Mar 30 – Apr 2 - ON DEMAND Conference & Expo
June 8-10 – IPA Technical Conference, Chicago

8. Which Press is Best?

The report aims to present the findings of the Digital Print Forum 2009, it is not appropriate for us to make recommendations or draw conclusions from the data. The results presented will allow users to make informed buying decisions about digital printing systems. It is left up to the end-user/future customer to review the data and make purchasing decisions that are relevant to their own printing requirements and priorities.

It would be impossible to declare the “#1 car” in the world. What criterion would be used to arrive at that statement? What is the most important issue - gas consumption, safety rating, pulling power, acceleration from 0-60 mph? Everybody will weigh these parameters differently, in the same way, while it is difficult to declare the “#1 digital press”, it is however possible for the user to define the “#1 digital press for you”. This report provides information so that you can identify the right press for you and begin to ask the right questions as you understand the challenges and opportunities of digital print production.

9. Delta E

Throughout the Forum report, traditional ΔE^*_{ab} will be used, in order to provide a benchmark for backward comparisons. In recognition of the newer equations and to provide compatibility with the other IDEAlliance certification procedures, data will also be expressed in ΔE^*_{00} .

10. Digital Press

A condition of the Forum is that each system entered in the Forum must be shipping and commercially available — R&D, beta devices or development software and products are not permitted (except for the situation of “offline” testing as described above).

It is the intentions of the Forum, that all the submission components will be done on a single device. Suppliers should review all the tests to ensure that the chosen device configuration can create all the required print samples.

11. Substrate

It is possible to source a common paper for all participants. In fact, that approach was used when similar studies were conducted by PIA/GATF in 1999 [1] and 2003 [2]. In those studies the same paper was provided to all suppliers. Today, suppliers can sometimes prefer their own “certified” paper types that work best with their machines. Via a series of conference calls, we will reach a consensus, perhaps all suppliers will use the same category of paper, but not necessarily the exact same brand and stock. It is suggested that the suppliers will select a mid-range, house stock and use the same media for all tests. For example, all suppliers could be instructed to use a coated, gloss finish, 80lb/120 g/m² text stock for all tests. We may specify L*a*b* values and/or a brightness value.

In 2009, do we seek to use the same paper type for all suppliers?

In 2009 do we create some test parameters for digital papers? If so what would this process look like?

12. Visual Images

Each supplier will be required to print visual images chosen for the usual characteristics of flesh tones, memory colors, etc. The reproduction style will not be specified, suppliers will be asked to produce good output quality as if for a typical customer job.

13. Visual Ranking Experiment

The reproduction of images is very important, yet very difficult to measure. New in the 2009 Forum we plan to evaluate the perception and preference of image reproduction styles.

A common technique in image preference studies is paired comparisons in which two hardcopy images are presented at a time to a subject who must choose the better looking image. Another pair is then presented and the viewer continues to choose the “better” image of the pair. At the end of the experiment it is possible to determine the print or type of print that the observer likes best. This version of the experiment has no scale or overall reference, and merely ranks the prints in order of preference.

To do this experiment with even a small number of 10 prints, creates 45 pairs that must be evaluated. It will be difficult to practically conduct such a test, instead a modified version of this test can be considered. It is possible to use an anchored-pair comparison process [3] in which a very good and very bad print will form reference “anchors”. Using mathematical models it is possible to use a smaller number of pairs, yet determine the same preference ranking that would be achieved with a large number of “open” print samples.

In the IPA test, there may be 5 static prints and one vendor supplied print. The vendor print would be the same size and format as the static prints. 10 pair combinations will be presented in an anonymous fashion and a note of the preferences of the observers will be noted. With reference to the static prints, the preference of the vendor sample will be noted. Based on this it will be possible to evaluate the user preference for the reproduction of images from a given system.

14. Sheet to Sheet Variability

In this test we will measure the sheet-to-sheet variation over a press run. Suppliers will submit 1000 printed sheets. From these sheets, # 1, 100, 200, 300,1000 will be pulled. The density value of the C, M, Y, K solid will be measured for these 11 sheets using an X-Rite 530 or 930 spectrophotometer. The experiment seeks to measure any variation of the print process over 1000 sheets.

Is it desirable to measure the device to device variability?

It is necessary to measure the behavior of the device on different days?

15. Sheet Variability within a Page

In this test we will have a target repeated at different positions on a page. We will measure the value of the same patch at different positions on a page and determine the uniformity of printing within a page.

16. Variation of a Tint

This test seeks to quantify a well known issue in digital printing. Can the digital production press reproduce a tint evenly across a page? Does digital printing have more variability than an offset press? An image will be specially constructed, with two areas of constant CMYK pixel values; 50, 40, 40, 0 and 0, 0, 0, 50. We will visually judge any distortion or patterning across these large near-neutral image blocks. We will also use Roy Rosenberger's Verity IA, scanner based technology, to quantify the mottle or perturbation across the image area.



17. Color of the Colorants

ISO 12647-2 is an international standard that describes conditions for offset printing, including the color of the printing inks [4]. The color of the digital press colorants (toner, liquid ink) will be compared to ISO standard inks as specified in ISO 12647-2. From the standard we chose the color of the printing inks based on paper type 1, gloss-coated, measured with white backing - this best represents the configuration used in the Forum.

It is not necessary that the colorants of a digital print process correspond to offset printing inks. It is interesting to see if the suppliers attempted to match offset inks in their choice of colorant. If there happens to be a good correlation between digital toner and offset inks, then the work of a color management system is made easier, any pixel value, for example, 70% cyan on the digital press will look similar to 70% cyan on an offset press. It would be possible to obtain a good color match, for example, using only the GRACoL G7 calibration process, if the digital colorants are similar in color to offset inks.

18. Darkest Patch

In digital printing the darkest patch may or may not be 100% K. A "black" color on paper can be made from black toner only, i.e. a single-color black or we may decide to create black from black and other colors. Rich black or 4-color black may consist of C, M, Y and K. In digital printing the black overprint situation may improve uniformity and mask any unevenness in print quality. The addition of CMY to K can either make the black patch darker or it can introduce a tint and appear lighter, so that CMYK black may produce a black that is less dense than 100% K.

In this study, data from measurement of the IT8.7/4 target will be examined to determine the patch with the lowest L^* and least color (minimum a^* and b^*). We also seek to record the L^* of 100 K.

19. Pantone® Colors – Test I

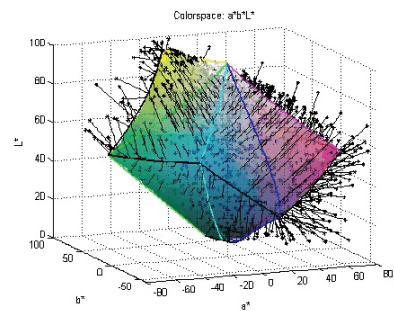
Special colors are a necessary part of many print jobs today. The Pantone® system may be used to specify special colors in a design or page. In Pantone Colors - Test I, it is useful to confirm that the RIP in a digital print system is able to detect spot color objects (either as $L^*a^*b^*$ values or Pantone names) and produce a good match to the Pantone Formula Guide. The vendor is free to use the Pantone name, digital library or any other internal iteration system they chose to reproduce the color.

A digital file will be made available, containing 10 Pantone colors. These specially chosen colors are expected to be in-gamut of a commercial offset print process, as represented by GRACoL 2006 characterization data. Each press supplier will be asked to print these colors so that they match the Pantone Formula Guide. All participating suppliers will be provided a particular formula guide, e.g. Pantone Formula Guide (Solid Coated), Fourth Edition, Third Printing. The printed samples and the Pantone book will be measured using CIE $L^*a^*b^*$, D50/2°, black backing and an X-Rite 530 or 939 device. The difference will be expressed as Average and Maximum Delta E.

In the 2009 Forum, are we ready to use the Pantone Goe system?

20. Pantone® Colors – Test II

How many Pantone colors can a digital press reproduce? A percentage of Pantone colors are likely to be outside the gamut of a digital print device. In general, most digital print systems will be able to reproduce a useful number of Pantone colors via CMYK simulation. In Pantone Colors - Test II we will use the Pantone Digital Library from Adobe Photoshop CS3 and test to see how many of these colors are within the gamut of each device.



We will make an ICC output profile for each device from a “full gamut” IT8.7/4 target printed by the supplier. Next using Graeme Gill’s Argyll color management library and CMM [5], we will use command line instructions to determine how many $L^*a^*b^*$ values would be clipped and thus outside the color gamut of the device. It may be useful to introduce a Delta E tolerance to the experimental results to better match what we see in real-life. We will compare this data with equivalent data provided in sales literature.

21. Matching a Printing Condition – GRACoL and SWOP

We request IT8.7/4 targets for each supplier entry. We request targets that are printed either with “full-device gamut” or to meet a reference printing condition. It is interesting to know if suppliers have a process to achieve a colorimetric match to a given characterization data set. It is not generally necessary that a digital press match an offset press, however there are many situations where digital may be placed alongside offset printing in a publication. This test will be based on a colorimetric (CIE $L^*a^*b^*$ Delta E) correlation of the vendor’s print to a chosen characterization data set. There will be three reference printing conditions

- GRACoL 2006, Coated #1
- SWOP #5 coated paper
- SWOP #3 coated paper

The measuring instrument will be the Eye-One iSis XL, UV excluded. For each printing condition, the supplier will submit 2 targets at 0° and 2 further targets printed by rotating 180°.

22. Fold and Crease Resistance

Output from digital printers can create problems during finishing. Toner sits on top of the paper and does not penetrate the paper like printing ink [6]. When the sheet is folded the toner can crack. This is especially evident in cases of heavy coverage and/or folding across the grain direction [7]. This test will be conducted at the Printing Applications Laboratory, Rochester Institute of Technology according to standardized test method ASTM F 1531. An image of a 100% K, “black cross”, will be printed by each supplier system. The sheet will be folded in the grain direction and at 90° to the grain direction. The cracked area will be digitally analyzed to compute the white paper visible using image processing techniques.

23. Taber Rub Resistance

Ink scuffing or rub off during shipping and handling can spoil the effect of quality printed products. The rub resistance of a sample will depend on many variables such as the choice of media, coating, characteristics of the toner particles, etc. Various instruments exist to determine the rub resistance of a printed sample, the Taber test is well established and accepted. The Taber test will be conducted at the Printing Applications Laboratory, Rochester Institute of Technology according to standardized test method ASTM 1478 [8].



In the Taber test, the sample is mounted on a rotating turntable, specimens are subjected to the rub-wear action of two abrasive wheels. Driven by the test sample, the wheels produce abrasion marks over approximately a 30 cm circular ring. This reveals abrasion resistance at all angles relative to the grain of the paper. The device simulates the motion of a truck or train during shipping, or processing of high-speed mail by the US Postal Service. At the end of the test, the before and after print will be measured and the % loss of density computed.

In 2009, we will solicit two samples from the supplier – one with and one without a protective coating.

24. Fade Resistance

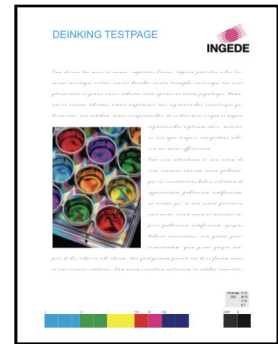
The early days of inkjet printing were plagued by dyes that exhibited fading and discoloration. Today inkjet prints show very good permanence. It is useful to use similar analysis to evaluate the stability of digital print processes. An accelerated aging test exposes print samples to light and heat to determine their resistance to fading. The lamp emits intense UV radiation, which in a matter of hours approximates the destructive effect of a much longer period of ordinary daylight. These tests are an effective indicator of the degree of light stability that can be expected of a printed sample. The fade tests will be done in the Xe1 device that is part of the Q-Sun range of xenon test chambers from Q-Lab (www.q-lab.com).

Samples will be exposed in steps, up to a maximum duration of 160 hours. The test will be performed in accordance to DIN 16525 "Testing of Prints and Printing Inks of the Graphic Industry" and ISO 12040. The Blue Wool scale is comparable to ASTM D 5383-02 and ASTM D5383-97.

In this test it is proposed to measure changes in density and L*a*b* difference between the start and finish as a function of the Blue Wool scale ratings. A visual comparison is also part of the standards mentioned above, therefore a visual evaluation of any perceivable fading will be done.

25. Deinking and Recyclability

Green printing and sustainability are becoming important considerations in the market today. Good recyclability of printed products is highly desirable. Processes that improve image quality need to be balanced with the removal of these same particles during the deinking and recycling process. An emerging standard in Europe is the INGEDE test [9,10]. The International Association of the Deinking Industry (INGEDE) has a well documented test developed in conjunction with paper mills, paper research institutes and digital print vendors. The deinking test is called INGEDE Method 11 [11]. The test is based on a test form shown here. In the IPA testing process, suppliers will be required to print 1000 copies of this form on their digital press.



Recycling first requires deinking. In deinking the toner particles are detached from the fibers and fillers of the paper. Handsheets will be made using “before” flotation pulp, i.e. undeinked pulp, and a second set was made using “after” floatation pulp, i.e. deinked pulp. The samples will be measured before and after the deinking process. The toner or dirt in the samples will also analyzed for total area covered, size and count.

At the moment we are searching for a research laboratory or university that can undertake this testing.

26. Carbon Footprint

Is there any consensus relating to a method to calculate the carbon footprint of a digital press? Can a procedure be defined and tested for the participating suppliers?

27. Press Speed

Digital presses are now used for production printing. Of major importance to end-users is the production speed of the device. The production speed is so important that some vendors include this parameter in the device name, e.g. Kodak NEXPRESS 2100 = 2100 A3 sheets per hour, NEXPRESS 2500 = 2500 A3 sheets per hour.

In this test we ask each supplier to use a stop watch to measure the time it takes to print 1000 sheets. We ask the suppliers to use a stop watch to record the start and stop time of the press run. There are a number of tests in this Forum that require the printing of 1000 sheets, so one of those press runs can be chosen to benchmark the press speed. A sheet with known coverage, the INGEDE test form, may be specified. It is required that the test be supervised by an independent third-party.


28. Henry Freedman’s Resometer

The Resometer software product [12] and test page allows us to analyze the performance of the digital printing system including the RIP and the print engine. The test page can be used to effectively “interrogate” the rip and printing parameters.

It is essential that all participants own their own copy of this product before they submit their entry. IPA and IDEAlliance members can buy this for \$319 (\$374 – non members), see www.printtools.org.



29. On-site Reliability

In this test we seek to measure the practical “uptime” of the device. We seek to spend a working day, e.g. from 8.00 am – 4.00 pm at a printer site and note the number of times and frequency with which there is a paper jam, imaging problem, toner replacement, paper mismatch error, etc. The source of stoppage and the frequency, and the time it took to fix will be measured. A metric could be 

$$\frac{\text{Time running the jobs}}{\text{Total elapsed time}} = \% \text{ Productive time}$$

Two customer sites will be chosen randomly from major cities of Rochester, Toronto, Detroit or Chicago. The concept of the visit will be discussed with the printer, but the date and time of arrival will not be pre-determined, and our “IPA Observers” will just turn up and begin taking data.

30. Other work in this area



TC130 - WG3 – ISO 12647 is Technical Committee 130, with Working Group 3 that is looking at process control, proofing tolerances, printing tolerances, and aim points. There have been two meetings of TC130, WG3 this year – 17-18 April, 2008, Paris [13] and 23-24 September, 2008, Amsterdam [14]. The minutes of the Amsterdam meeting suggest that there will be a division of ISO 12647 as follows

ISO 12647-7 will deal specifically with a “Contract Proof” – existing standard
ISO 12647-8 will deal specifically with a “Validation Print” – new standard

Both of the above are based on the so-called “one copy standard” and not production printing thus the ISO Working Group agrees that a separate standard on digital production printing might be needed. Note that the “Validation Print” criterion is what FOGRA is using for their digital print certification process. The Working Group recognises the work of FOGRA and IPA/IDEAlliance in this area [14].

Larry Warter suggests that “as we move into a more open media workflow we must shift from defining our quality standards in terms of offset printing. To this end, IPA is forming a committee to develop best practices for image optimization and the resultant recommended workflows in a cross media or output agnostic process. This committee will be guided by efforts presently underway at ISO to move ISO 12647 in that same direction, and will, hopefully, serve as the practical testing arm for the US TAG to ISO. As such it should not require any special technical expertise except practical experience in today’s prepress workflows and a desire to test improvements and the resulting recommendations for best practices in a cross media workflow.”

IDEAlliance continues to develop procedures and protocols for the Digital Press Certification process and the IDEAlliance Print Properties Committee will meet on November 10-11, 2008 at RIT, Rochester, to further develop the process. <http://www.idealliance.org/activities/meetings/printp111008/signup.asp>

31. Contract

AGREEMENT – IPA Technical Conference Digital Print Forum – April 22-24, 2008, Chicago

AGREEMENT

This AGREEMENT (this “Agreement”) is dated as of October 3, 2008 (“Effective Date”), by and between Steve Bonoff, President, IPA, 7200 France Avenue South, Suite 223, Edina, MN, 55435 and [Supplier Name](#), ([Supplier Name](#)) with corporate headquarters at [Supplier Address](#).

IPA Digital Print Forum is hereafter referred to as “Forum”.

DETAILS OF EVENT

The Digital Print Forum 2009 is created and coordinated by the IPA – The Association of Graphic Solutions Providers.

- The aim of the Forum is to examine the real-world capabilities of the world's leading digital print devices to help our members and industry make informed strategic and technical decisions.
- The project seeks to collect printed samples from different digital print production systems, analyze these sheets and publish the results.
- The project seeks to provide input to the development of the IDEAlliance Digital Press Certification process.

DIGITAL PRINT TESTS

The Forum seeks to evaluate digital printing systems in an educational (non-competitive) environment. The Forum seeks to provide a snapshot of the state of the digital printing industry, from a technical perspective.

Digital production systems are to be evaluated in the following categories

- Color – consistency, GRACoL, Pantone, color gamut
- Physical print properties – rub resistance, cracking, folding
- Environment – Recycling, deinking, emissions
- Production – reliability, jamming
- Cost – ROI, cost per page, costing models

The specific details for each of these test areas are described elsewhere.

REPORTING OF RESULTS

- a. [Supplier Name](#) will be invited to participate in developing the test protocols during a series of conference calls and e-mail discussions. The audio recording of these discussions will be made available.

- b. Data will be listed in a non-competitive manner. There will be no league tables, or ranking. The data will be presented “as is”, with no attempt at qualitative analysis. The IPA will not say, for example, the “Xerkon” device is better than the “Canolta” device. The IPA will however, explain the data and the implications of the data for the benefit of the end-user.
- c. [Supplier Name](#) is invited to include a written statement in the Forum publication. In general, suppliers are encouraged to comment on any aspect of the Forum in the interest of continuing the debate and discussion around the use of digital printing in production environments. The supplier may use this opportunity to explore the results/data produced by their device.
- d. [Supplier Name](#) is invited to participate in discussion and analysis of the data.
- e. The data will be collected with utmost care. Dr Abhay Sharma is in charge of the measurement of the data, and has conducted these investigations for the last 5 years. Over this time he has developed a series of procedures for “double blind measurements” and double checking to ensure the integrity of the data.
- f. [Supplier Name](#) will provide samples for measurement and will be presented final results, prior to publication.
- g. There is no ability for [Supplier Name](#) to withdraw results once (f) has occurred.
- h. Technical mistakes and genuine misunderstandings can happen (on both sides). All attempts will be made to address and resolve these issues in a timely manner.
- i. Aside from clear-cut technical mistakes, there may remain some issues on which all parties may not agree. The supplier will be allowed to provide a written statement explaining their side, that will be given full, unedited space in the printed volume.

PERMISSIONS AND COPYRIGHT

- A) THE SUBMITTED PROOFS BECOME PROPERTY OF THE IPA AND CAN BE USED FOR STANDARDS WORK, E.G. GRACOL, CGATS, ETC. THE PROOFS WILL NOT BE USED FOR COMMERCIAL GAIN WITHOUT FURTHER PERMISSION FROM EACH SUPPLIER COMPANY.
- B) SUPPLIERS/USERS ARE REQUIRED TO HAVE PURCHASED AND OWN A LICENSED COPY OF THE TECHNOLOGY WATCH™ RESOMETER™ TEST CHART FOR THE LOCATION AT WHICH THE PRINTING TAKES PLACE. THE RESOMETER COSTS US\$ 374.
- C) SUPPLIERS ARE REQUIRED TO OWN THE COPYRIGHT TO ANY IMAGERY USED IN THE TEST FORMS, E.G. ISO SCID IMAGES.

- D) SUPPLIERS ARE REQUIRED TO SEEK APPROVAL OF ALL PRESS RELEASES FROM IPA, MARKETING LITERATURE, TRADE SHOW MATERIAL, ETC., THAT QUOTES DIRECTLY OR INDIRECTLY ANY OF THE FINDINGS OF THE FORUM.
- E) A CONDITION OF THE FORUM IS THAT EACH SYSTEM ENTERED IN THE FORUM MUST BE SHIPPING AND COMMERCIALY AVAILABLE — R&D OR DEVELOPMENT SOFTWARE AND PRODUCTS ARE NOT PERMITTED IN PUBLISHED RESULTS.

COST

The IPA does not seek to make a profit from this project as it is of educational value. A US\$ (TBD) charge is made for each supplier-supplied system. The supplier company will be invoiced by IPA, terms 30 days.

ENTIRE AGREEMENT

This Agreement shall embody the entire agreement between [Supplier Name](#) and the Company, and, except as otherwise expressly provided herein, this Agreement shall not be affected by reference to any other document.

WITNESS

In witness whereof, intending to be legally bound hereby, the parties hereto have caused this Agreement to be duly executed as of the date and the year first above written.

Steve Bonoff
President, IPA
Signature:
Name:
Title:
Date:

[Supplier name](#)
Address
Signature:
Name:
Title:
Date:

32. References

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- [8] *Standard Test Method for Determination of Abrasion Resistance of Images Produced from Copiers and Printers (Taber Method)*, ASTM 1478 – 06
- [9] *What makes a Digital Print Recyclable? First Results of a European Survey*, IS&T NIP22, 21 September 2006, Denver, Axel Fischer
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- [11] *Assessment of Print Product Recyclables – Deinkability Test*, Method 11, INGEDE, 2007
- [12] *Technology Watch*, Henry Freedman, <http://www.myresometer.com>
- [13] *Notes from the 35th meeting of ISO TC 130 WG3*, Process control and related metrology, N702, Paris, France, 17-18 April, 2008
- [14] *Notes from the 36th meeting of ISO TC 130 WG3*, Process control and related metrology, N752, Amsterdam, Netherlands, 23-24 September, 2008