

Paper Categorization Meeting  
ICC/ISO TC130  
15 June 2006  
Hilton Leeds City  
Neville Street  
Leeds, England

Craig Revie began the meeting at 8.30am, when participants introduced themselves and described their reasons for being at the meeting. The agenda was agreed with some minor updates

A wide range of companies were represented, with most participants from paper manufacturing, printers and prepress, with a small number of ink manufacturers and print buyers.

Presentations were made on a number of topics relevant to paper classification. The first, by **David McDowell**, described the need for paper properties in the context of color management. The goal was to understand more about paper properties in order to reduce the need to generate characterization data for each print/paper combination. He concluded by posing a number of key issues for discussion:

- What should be measured?
- How should tests be developed?
- How should the approach be evaluated?
- Are there other possible approaches?

It was noted that the existing classification categories contained wide ranges of paper types; for example, the uncoated category includes premium papers for fine art reproduction as well as basic office grades. These US text and cover grades are not included in the paper types specified in ISO 12647.

In the US, quality grades are linked strongly to the paper reflectance property for historic reasons, whereas in Europe categories are based mainly on the manufacturing process used. Hence properties do not correlate internationally.

Fluorescence in paper leads to problems in color management, since the instrument source used for measuring reflectance will normally have less UV content than the viewing illumination. Re-emission from the substrate was generally proportional to the amount of fluorescent whitening additive (FWA) present.

Paper gloss expands the color gamut in darker colors and shadow areas, although this is not best captured by the 0:45 measurement geometry which excludes specular reflectance. Otherwise gloss and matte papers have similar shades, and are not differentiated by wood content.

In consequence of these issues, there is a need to consider new ways of classifying paper. For the purpose of process control, gloss and matte papers have very similar CIELAB values and do not require separate categories.

Karl Meinecke noted that the same characterization data was being used for both paper types 1 and 2 in ISO 12647.

Byron Jordan noted that whiteness is by definition associated with CIELAB  $b^*$ , as a result of the way that CIE whiteness is calculated.

**Jouni Martilla** made a presentation on problems with current paper categories . Since paper grades were less clearly demarcated in the current market, there was a need to review the classification used in ISO 12647. The web offset grades do not include the higher-quality papers being used, and there is a need for more web grades in the standard.

He demonstrated that there is a big range in shade and luminance in the papers currently on the market. The ‘matte’ grade in ISO 12647 actually relates better to silk grades on the market, and the difference between silk and gloss is much smaller than between silk and true matte papers.

The main paper-related property affecting color was ink demand; this was affected by the surface roughness and oil absorption properties of the paper.

Byron Jordan observed that paper chemistry was also important.

**Danny Rich** presented information on paper parameters that affect color reproduction . In this he noted that the ink absorption had a significant effect on color gamut.

**Karl Meinecke** presented a summary of paper classifications for gravure and offset and supporting papers on a proposed categorization for offset papers and gravure papers . Characterization data is available for some of these categories. The classification of gravure papers is available (in German) from [www.bvdm.org](http://www.bvdm.org). An English version will be available at this site in a couple of days.

It was observed that paper type 5 could be dropped from ISO 12647 as it was no longer important. It was agreed that it was important to reduce the number of categories as much as possible.

**Trish Wales and Anne-Sophie Gombart** presented information on paper classification properties, ISO 12647 and regional differences in paper manufacture.

Trish Wales also presented information on brightness classifications. She clarified that there were two different standard methods for measuring brightness, using Illuminants C and D65 respectively, the latter giving a higher numerical value. Karl Meinecke stated that the D65 method had been used in the data presented.

Craig Revie suggested that it was important that a worldwide consensus on paper categories is agreed even if we start by defining a set of categories appropriate for European users.

**Nils Pauler** of M-Real presented current activities in ISO TC 6-WG3 (Paper, board and pulp – optical properties) .

He discussed the organization of the group and noted that he acts as liaison from TC6 to ICC. He also discussed instruments used in the paper industry and noted that calibration is a major issue. He reviewed the standards for reflectance measurements (see list in presentation) and highlighted the new ISO numbers and new methods for reflectance measurements.

He then reviewed the calibration hierarchy for absolute reflectance measurements based on the perfect reflecting diffuser. This is important because all of the larger pulp and paper companies rely on ISO standards.

He discussed a new color measurement method in ISO CD 5631 which he felt might initiate some discussion and perhaps some disagreement in the group.

In summary, he asked if there is a need for common optical measurement methods, can we use the instruments of today and finally will there be new spectral scanners and or digital cameras in the future that will be useful for the paper industry.

He mentioned a book entitled Color Engineering which was co-edited by Phil Green as an excellent source.

How reliable are the measurements when you use different instruments? Mr Pauler found significant differences between devices in tests his company conducted. If you follow the ISO calibration methods, the difference between two instruments is about 2%. The calibration method provided by the instrument supplier is not sufficient and the ISO method should be used.

Why differences in measuring under C and D65? There was a lot of history of doing measurements under C however after fluorescents was added to the standard, the measuring condition was changed to D65. This results in higher numerical brightness and whiteness values, and is therefore often preferred by the paper industry.

**Trish Wales** reported on IDEAlliance which is a group that governs some of the standards within the graphic arts industry. She announced a new task force is being formed of 8 paper manufacturers, paper dist, publishers, printers and print buyers. They want to understand how to characterize paper in the printing process. The position paper of this group is included to these minutes. This group could be a good focal point for US companies to provide input into this process and develop a US view on paper characterization.

Laurel Brunner felt that there were differences in how Europe and the US approached paper characterization and she hoped that this would change as we go forward.

A presentation from UPM on the paper market was also made available to the meeting. .

**Byron Jordan**, chair of TC6 WG3, reported that the technologies used with optical measurement was broad and needed a separate group within TC6. It deals with reflectance, gloss and measurement of paper. TC6 deals with defining measurement processes and not measurement classifications. Sometimes classifications have been used as non-tariff barriers to trade. We need to recognize that each side of the paper issue, there is a rich literature and a lot of understanding but the two do not speak well to each other. There are good reasons why each performs measurements the way they do.

The surface chemistry can be difficult to measure due to the contact angle on a rough surface being ill defined. This controls whether the ink will sit on top of the paper or be absorbed. The defining characteristic was whether or not the ink would flow within an area on the paper.

Print gloss is not necessarily determined by paper gloss, the ideal being a matte paper with a high gloss. Print gloss enables high densities and print contrast to be achieved.

Translucency deals with how far the light migrates within the sheet. Different papers have different ranges. This can affect measurements it is necessary over illuminate (i.e. have a measurement aperture smaller than the area illuminated) to adjust for this effect.

Gonerefectance is another issue affecting measurements which makes different instruments get different results due to the inherent geometry of the instruments.

All of the above are reasons why the measurement methodology is defined as it is.

The whiteness measurement deals with how much more radiance you have in the blue rather than the green. Dyes can be added to bring the reflectance of the green down which makes the paper appear whiter. For this reason, the standard deals with brightness more than whiteness.

**Fred Dolezalek** presented properties of printing papers and provided some specifications and basic requirements for data generation and the control of the printing process. He attempted to summarize what we heard during the presentations this morning. There are two areas where we need to know better properties of paper:

Visual properties of the printing products relevant to prepress and on-press process control. This permits choice of characterization data and proofing substrate.

Mechanical and other properties such as dimensions, mass per area, roughness, stiffness, etc. as this helps the printer so that he can better choose materials that are appropriate for his press and provides inputs for JDF.

Visual properties require the paper color, surface type, gloss and opacity. To a lesser degree the degree of fluorescence and TVI as compared to a standard paper.

He then showed 5 paper classes and their varying gamuts which varied greatly.

Suggestions: he felt that the standards needed revision such as dropping PT5 and PT2 from the offset cats and add 2-3 new categories. The possible shift of paper colours to the blue and

making gloss informative as well as replacing the criterion of mass per are by opacity were other possible changes needed.

For mechanical and other properties, there have been some tests conducted in Germany which are highlighted in his presentations.

In closing, he encouraged the paper manufacturers to identify what classes their various papers are categorized as this would be a great aid to printers. The problem is that the classification of papers in various regions of the world could differ because the paper was measured according to different viewing conditions (D65 vs. D50).

Jan-Peter Homann presented a proposal on Papertypes, gamuts, graybalance, TVI, NPDC, characterization-data and ICC-Profiles .

Following the final presentation, the chair then opened the meeting for discussion with a summary of the problem statement from the invitation document. Essentially it was difficult for the user to know whether the paper being used is sufficiently similar to that used in making the profile.

Ann McCarthy suggested that it was important to capture printing characteristics for other applications such as office use. However, the meeting agreed that the focus of the meeting was paper for graphic arts applications and in particular ISO 12647. The need was felt to be to solve the core problem of publication and commercial printing. Dave McDowell observed that there was another standard which covered office papers. Laurel Brunner asked whether packaging grades were included, and the meeting decided that they should not be at this stage since that introduced a much wider range of categorization issues.

Martilla Jouni asked whether if there just two paper categories for which unified characterization data could be generated, would it help the print buyer.

Michael Farkas of IKEA responded that the profusion of categories makes it difficult for the specifier, who needs greater simplicity and hints as to how to order paper and apply color management.

The question was asked what the reason was for the differences between shade preferences on different continents, with Europe significantly bluer than the US and Asia. A participant from Stora Enso responded that shades in the US were drifting towards those in Europe. There were differences in manufacturing processes between US and Europe, but paper makers were trying to meet customer preferences. She also noted that globalization may lead to a change in preferences and a reduction in the differences. Another participant noted that classification properties need to be based on what is actually used in the market – for example, European papers are bluer than ISO 12647 shades.

One participant commented that CIELAB was not sufficient for defining paper properties, and different shade categories were needed. He liked the matrix approach shown by some presenters, which may help the user select the correct paper.

Karl Meinecke suggested that a small number of classification properties were needed. The existing set of profiles was already difficult for customers to understand; maybe it should be an aim to edit a base profile rather than make new profiles.

Fred Dolazelek stated that ISO 12647 was largely based on European input. Now we are in a better position to update the standard. He also observed that the shades specified in ISO 12647 were intended for proofing, but people expected to also use them in process control for production (where different tolerances apply). The market had developed since the ISO 12647 specification was published and it was certain that the paper types on the market will be different in another ten years.

A participant commented that dot gain was one of the most important paper parameters. Tests held by user groups indicated that different papers from the same manufacturer could have 6-8% differences in dot gain when printed with the same solid density. Roughness was not the main variable, since papers of very different roughness could have the same range of dot gain.

Bob Hallam suggested that the key factor that printers need is a metric for surface quality, including especially the ink demand. It was important to know in advance of production what the level of dot gain would be, for example to predict the volume of ink required by a job. Craig Revie responded that gamut was a limiting factor, while dot gain could be adjusted and was therefore a secondary measure.

Uwe Berthold observed that fogra had recently developed a test method for tonal value increase using a printability tester, but had not been able to get results which agreed with production values. Fred Dolazelek commented that determining TVI in an absolute sense is difficult, and suggested that possibly relative TVI, compared against a standard paper, would make sense. The paper makers present noted that the characteristics of the standard paper would need to be known.

Martilla Jouni reported on a large scale study which had been undertaken: for papers of the same basis weight printed by the same process, the coating and furnish affected the TVI. TVI is also affected by the compressibility of the paper surface, and since heavier basis weights of the same paper are smoother, there are TVI differences based solely on grammage.

The chair then asked the meeting to turn to the question of how to take the issues discussed in the meeting forward. He proposed a working group with Uwe Berthold of fogra as coordinator. This was agreed by the meeting, with the proposal that the group should report to the next ISO TC130 meeting, recommending changes to the existing standards and any new standards which are required.

Byron Jordan suggested that both papermakers and printers should be represented in this activity, and that it was important to have a range of participation to avoid privileging a single supplier.

Trish Wales observed that there was a good synergy between this activity and that of the IDEAlliance initiative, and agreed to act as liaison between the two groups. Craig Revie suggested that formally the activity to define categories should be considered a TC130 and that

IDEAlliance should be encouraged to provide input to this group to ensure that US paper manufacturers and print buyers are well represented. He also suggested that the group should include a liaison with ISO TC 6.

The following delegates agreed to participate in the working group:

- Michael Farks (IKEA)
- Byron Jordan (Paprican)
- Trish Wales (Sappi)
- Anne-Sophie Gombart (Sappi)
- Nevelle Bower (Felix Schoeller)
- Teuro Leppanen (UPM-Kymmene)
- David McDowell (Kodak)
- Bob Hallam (Quebecor World)
- Karl Meinecke (bvdn)
- John Davison (Davison Chemographics)
- Martin Gercke (Stora Enso)
- Peter Garnham (Polestar)
- Craig Revie (Fuji Photo Film)

Uwe Berthold noted that there was an ISO meeting in September. The working group should meet there, and he will plan to have a proposal for review at this meeting.

Craig Revie noted that some people were not represented at the meeting, and it was important to include other interested parties such as Japanese paper suppliers. As guidance for other possible participants, it was agreed to make available the meeting minutes and a mission statement from Uwe Berthold.

Martilla Jouni suggested that we should make a priority of providing characterization data for new paper classes including high-brightness LWC, and emphasized that it was important to have common data for US and EU. Fred Dolazelek agreed but noted that it was not just technical information that was required.

It was suggested that the ICC Graphic Arts Special Interest group could be a way of continuing discussion on the issue of reducing the number of characterization data sets.

The chair thanked the participants and closed the meeting at 12.30pm.