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the next generation

# Rendezvous with Dieter

An interaction that began two years ago culminates in a fascinating printalogue between **Dieter Kirchner**, the unconventional printing scientist and Professor and **Dr Rajendrakumar Anayath** head of the PMA at Heidelberg India in Chennai.

**M**y interaction with Dieter began two years ago when we decided to learn more about offset machine standardization. Guenther Keppler was instrumental in bringing to India for the first time Dieter Kirchner – a true avant-garde and an altruist with a passion for printing and a real boon to the print media industry. As it happens, Guenther and Dieter have a fantastic ‘mental frequency matching’ in thinking, analyzing and conceptualizing fundamentals. Their joint effort opened up new horizons in the concepts of standardization in prepress and printing for all of us that eventually changed our perception of this topic. During his recent visit to India I took the opportunity for a detailed dialogue with Dieter on various subjects.

**RA – Since when have you been in the print industry and what are your favorite areas in printing technology?**

**DK –** I started in 1964 as an apprentice in a prepress house converting photographs, images, paintings. My interest towards printable colour separations was aroused and of course landed up in understanding more about the characteristics off offset plates and printing.

In my early days I was a passionate photographer and even did some professional work. My special interest was in reproducing any object precisely in a photograph and to emulate the photograph in the print process.

In those days almost everything was manual and based on hand craft – purely skill based. It gave me plenty of opportunity to try out uncommon approaches (which may seem funny) to improve the quality of the printed result. We wanted to be as close as the original image taken by the photographer or painted by the artist whenever reproduced by printing.

**RA – I know that you fell in love with offset long ago, what do you think about the future of offset printing?**

In comparison with various printing methods like gravure, flexography, digital, and inkjet, offset is the most flexible when it comes to special applications and for achieving enough quantities consistently, and with the highest reproduction quality. I am not denying that each printing process has got its own niche. But when it comes to a wide variety of special applications and superior quality, none of the above listed processes can reach the offset level. ▶▶



►► The recent development of processes like 'PAN4C' colour separation and 'ICC' profiles to control an offset press through the natural phenomenon of 'simultaneous contrast' open up a totally new dimension of quality in colour and image communication. Having already tested these I am convinced that the offset principle is still in a beginning stage and certainly holds a decent future potential.

**RA** – We heard that you spent decades in doing research on *Ink-Water Balance*. What is the basic crux of I-W-B?

**DK**– The major subject of concern in the offset process is the right balance between ink and water. Poorly adjusted dampening solution in the press will immediately lead to an improper ink split. If we need too much water to get the 'plate running free' or call it a 'clean plate,' it will result immediately in ghosting, colour variation, inconsistency, drying problems, uneven dot gain, bad ink trapping etc. etc. In this situation, 'the offset press is not reproducible' because each sheet is different or rather, inconsistent.

Since ink split as such cannot be measured alone, I developed an Analytical Test Form to visualize the result of ink split. This development took several years of Tapas (meditation) and constant effort till I arrived at the current version. Using the Ink Split Analysis Test Form, we are able to visualize what happens in the press precisely and able to see and identify the root causes of problems. Thus we are able to act immediately with dedicated counter measures.

**RA** – Can you explain your very novel – *Analysis Test form – PAN 4C*?

**DK** – Getting the right ink split on low level dampening is only half the story. Therefore the *PAN4C Analysis Test Form* is just one spoke in the umbrella of the PAN4C Test Suit System comprising 4 test forms for various analyses for standardizing printing — *an Analysis Test Form, an Inking Unit (Roller) Test Form, A Gradation Test Form and a Mixed Test Form for Print Control*.

Additionally there are a few more test forms – for *CtP/CtF; Print Control Wedges; and Colour Look Up Tables*. By applying this complete set of test forms known as the *PAN4C Test Suite System* — the entire process from image editing to printed sheets can be standardized on a high level quality by matching the original image with the press' stability. However your question is mainly about the Analysis Test Form.

This test form consists of control elements that can be read optically and electronically using a spectrophotometer. Using the optical patches and elements the behavior (problems and or defects) of the ink split can be seen and thus the profile of the dampening system can be visualized.

An improper ink split is the result of a chemical reaction between ink, dampening additives and auxiliary substances. It can also be influenced by a too high tolerance in the roller adjustment or damaged rollers. All the possible root causes or factors that influence bad split of ink can be visualized on the test form. We can literally use this test form like a roadmap or navigation system which gives us the right hints and correct direction to eliminate the wrong path thus avoiding a failure or rather a disaster.

Part of the test form consists of patches indicating the optimal dampening level and the dot gain tolerance influenced by the 'unevenness of the water layer'

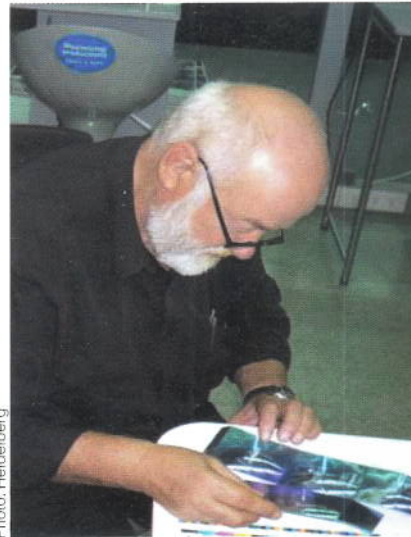


Photo: Heidelberg

Dieter explains laser cutting applications for novel packaging designs

transferred. These patches can be analyzed by visual means and tell us the behavior of the plate under the given ink/dampening combination (whether the plate is 'running-free' or 'clean') and the identification of the right transfer curve for CtP plate making. This combination gives us a full set of information at a glance immediately and within a very small tolerance of 2 per cent. A byproduct of the analysis is that all chemical reactions and interactions happening in the press can also be double-checked.

**RA** – How do you define gray balance? Why is it so important in offset printing?

**DK** – Before we discuss gray balance we have to understand the biological history or evolution of human eyesight. It took a long time to arrive at the present day perception system which is based on 3-pairs of colour perception design.

The first pair – 'Primary Eyesight' is the 'black and white.' In that segment the entire spectrum of colour perception depends on the intensity of light or the strength of illumination. The result is an image in black and white with all the shades between full high light to complete shadow. This primary image gives us the feeling of (3-dimensions) space .

The second pair developed in carnivorous animals and is based on the 'Primary Yellow' (perceptual primary colour) and the 'Primary Blue.' A hundred million years ago when the first blooming plants developed colourful fruit, one result was that some animals specialized themselves on vegetarian food and extended their eyesight with the third pair of colour perception, which is the 'Basic Green' and the 'Basic Red.'

Allocating different colour spectrums to the gray shades of the 'Primary Eyesight' (black and white) causes an extension of the gray shades towards colour. With that Gray becomes the center point for colour balance. In other words, Gray is the king pin that controls the colour balance of whatever we see.

This understanding is a must and very important for all types of colour printing methodologies and colour separation processes. Do not think it is just restricted to offset.

In a long series of experiments where I used different combinations of gray patches to test different age groups (both male and female) of various folks from all parts of the world – starting from children to youths to middle aged and



▶▶ The basis for all these achievements (i.e. printing better than photographic HDSP) is based on standardization using *PAN4C Test Suit System* procedures. Many European ink manufacturers describe PAN4C as the most merciless test procedure ever seen. On printing presses we could deliver a consistent proof. [One has to use] presses that can really pass this tough examination of distributing the dampening solution layer absolutely evenly well within the defined, narrow tolerances in the printing direction.

This is the base for achieving extremely high printing densities very evenly on the substrate at the same time comfortably achieving consistent reproducible dot gain without any colour variation.

*It is quite amazing to know about High Definition Skia Photography (HDSP) and the toughness of your merciless test form. Tell us more of your understanding of standardization in the offset industry.*

My understanding of standardization is embedded in the *PAN4C — System*. This comprises the standardization of image data by applying photographic like colour profiles that enable the press control system via simultaneous contrast (against black) while printing. Because the basis of the conversion profiles are from *PAN4C colour separation look-up tables* that make it possible to print a colour guide which simulates the real colour management that happens in the human brain. Thus for first time in the history we have a precise colour communication system for offset printing.

The second point in the process of standardization handles the transmission of the digital data to the plate. For that we have dedicated curves for CtP and CtF avoiding any losses of image data. Those curves do not depend on any press.

The third point deals with the standardization of the press, using the *PAN4C Analysis and Gradation Test Form*. By applying these forms it is now possible to get offset presses adjusted to a quality standard that is acceptable worldwide.

The fourth point in standardization is the *PAN4C Mixed Test Form* which is dedicated to checking out the screening programs. We predetermine the ink and fount solution (which we identified earlier as the best match or 'best cocktail' for the press) and assess the dot gain, ink trapping, maximum density, gray axis tolerance, the tolerances between the ups and whether ghosting is well within the limits of PAN4C.

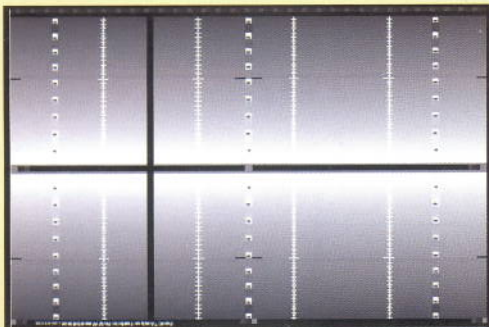
The fifth point is of measurement techniques. This field is incorporated with specific, defined procedures and precise guidelines to print in a reproducible manner.

An important point when dealing with standardization is the analysis of failures. Once the printing process is standardized as described above, any failure in printing can easily be detected and eliminated. As a result even short print runs can be executed safely with complete consistency and reduced wastage.

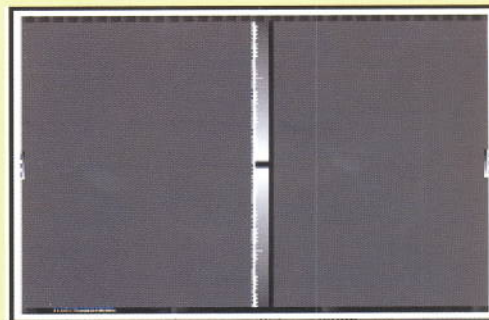
*All these concepts are totally new to me and thanks for your precise answers. Tell me what was the purpose of your visit to India? What do you think about the Indian printing industry and its future?*

The reason for this journey was basically to train Heidelberg India's print instructors on problem solving skills and analysis of dampening solution and ink. In addition we went to some of the printers with problems – some were chronic and we did the training on their premises. The results were very appreciable and highly encouraging. ▶▶

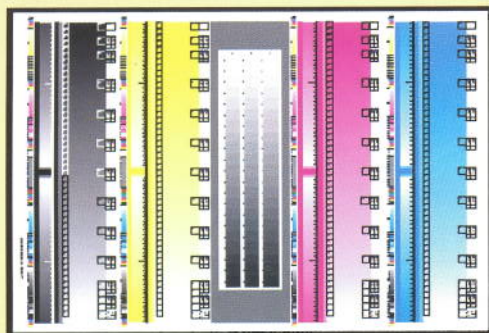
Appendix: VARIOUS PAN4C TEST SUIT SYSTEM FORMS



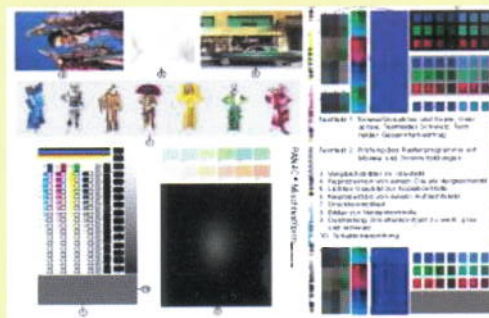
(1) PAN4C — Analytical Test Form



(1) PAN4C — Analytical Test Form



(3) PAN4C — Inking Unit (Roller) Test Form



(5) PAN4C — Mixed Test Form



old, in order to know their preferences – I could establish and prove that humans have a very special emotional understanding of Gray. A slightly 'Warmer Gray' is perceived as 'More Spatial' (three-dimensional) compared to a 'Colder Gray.' Since the ability to see more three dimensionally or with a higher degree of dimension is emotionally of high importance to humans, we prefer the slightly 'Warmer Gray' and thus the warmer gray is the 'Right Gray.' As a conclusion we state that – even and consistent printing and or reproduction of gray – is the key or the most important rule of thumb for all printing principles and or processes.

*This explains why 'Gray' is so important to humans. Can you say something about the Gray Balance Test Chart which you have developed? How do you differentiate this from the conventional one?*

The test chart for finding the right balance in gray is an integrated part of the third test form (*Gradation Test Form*) in the PAN-IC Test Suit System. Using this test form with three defined gray axes represented by three step wedges which represent a 'Cold,' a 'Warm' and a 'Neutral' gray, we are able to find out the tolerances of the printing units in conjunction with the kind of ink in use. The tolerances of the tonal values should be within 2 per cent between the single printing units. In case the tolerance exceeds 2 per cent a modification of the ink is required.

The three above-mentioned Gray Axes or Gray Shade Wedges are low metameric separated. Hence they are in accordance with the natural eyesight of gray under normal lighting conditions and do not correspond to the CIE Lab values.

But at the same time we can also elaborate the 'Ideal Gray' via CIE Lab values for process inks under normal light, daylight and artificial light conditions. Such precision is feasible with the *PAN-IC Analyses Test Form*.

*RA – What is your opinion of today's colour management systems in practice?*

The 'Colour Management' currently in practice has nothing to do with the management of colour. Colour management takes place in the human brain. It is the mental result of the behavior of the three pairs of eyesight in relation to complementary colours and the simultaneous contrast of various colours in relation to the surrounding colours.

The current colour management in practice is a simple attempt to match the proof to the press by adapting the image data via ICC profiles and the press via CTP gradation curves. The results are still not really convincing in the sense of really standardised printing at the highest quality levels.

*You told me in an earlier interaction that a photograph can be printed as well as the original. Can you put some more light into that?*

One year ago I introduced the so-called high definition Skia Photography (HDSP) to the photographic society – the method of photographic reproduction using offset printing

which exceeds in performance all the existing printing technologies and outperforms the common silver halide base photographic paper printing too. This methodology was widely published in trade magazines and the internet.

Photographic paper achieves a maximum image contrast of 2.4 optical densities whereas high definition Skia Photography (HDSP) could reach a contrast of 3.0 which corresponds exactly with the maximum contrast that the human eye can perceive.

In order to do this I developed an electronic darkroom where image data can be segregated according to the behavior of the chemical photographic developer. This is still considered the Golden Rule in professional photography and it is nothing but gamma curves.

Using specific offset inks we can now simulate in an offset press the behavior of chemical developer in conventional photography. Images and pictures printed by the above method are extremely spatial at the same time with a richness of gray shades which none of the existing photographic papers can ever achieve. So the 'punch' in the printed picture will be superb.

This process 'HDSP' received a lot of attention in Europe and draws many discussions. My intention was to materialize an old dream of mine by capturing the reality of an image in the most authentic way and at the same time prove that offset is still the superior printing principle. Many times, I feel it is the beginning of the future when it comes to quality reproduction.

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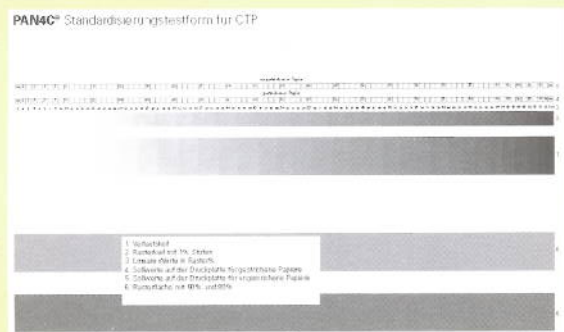




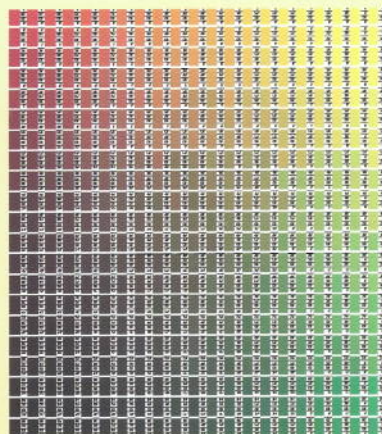

OTHER IMPORTANT ACCESSORIES (FORMS) AS A SUB-SET OF THE PAN4C MAIN SUIT



PAN4C — Print Control Step Wedge



PAN4C — Plate Test Form for CtP/CtF



PAN4C — Colour Look Up Table for separations

►► This time I have only had a short stay in India. However I recognize clearly the potential of the Indian printing industry. I am convinced that it will have a great future. The printing companies here are eager to improve their print quality and the operators are open to learn and strive for better knowhow. Hence I can see a great future.

Many areas have a scope for improvement. For example: lack of training, shortage of skilled people and need of investments in modern technologies to name a few. However, this is just a matter of time. I am convinced that the Print Media Academy is doing a wonderful job here and in conjunction with the Indian printing fraternity, PMA can do a lot for the future.

Indian people and their culture left a strong feeling in my heart and an everlasting impression in my mind. I am sure I will visit again.....

*Thanks for your kind words. How is printing technology changing in the West?*

The print media industry will increasingly specialize to find its own customers/print buyers, with the right products and solutions. We will see highly creative printers who will develop innovative, individual solutions for their customers. I mean a completely customized system. Printers will become full service providers offering everything from cradle to grave yard – from conceptualization, design, logistics, warehousing and after sales service. There will be the Classical Internet Printer acting as an extended service. Web to Print is already very popular.

The specialization of printers has already started in a big way in Europe. This trend will continue further and become stronger and stronger in the days ahead. In addition to the ISO standards we will see standards for photography that will develop offset even better and strengthen the position against digital print and electronic media. We will see printers building joint forces to cater to multinational clients. You will witness Cluster Groups among like-minded printers who practice the famous economic principle – the theory of comparative advantage. The number of traditional printers who are doing multiple products will certainly decline.

*What do see as the next improvement on an offset machines in the near future?*

The quality of offset presses today has reached a level that is barely improvable. The most important innovations I can foresee are standardization and measurement techniques which result in short set up times and less wastages. Remote Failure Analysis (Web Based Remote Servicing) through measurement techniques will be part and parcel of all future machines. It is certain that control systems will reach a stage where human touch will be a bare minimum. High-end packaging will be of great focus in the future and special applications will grow by leaps and bounds. We will also see growth in a variety of substrate handling techniques since RFID, Conductive Ink Printing and Printed Electronics will play a major role within a decade. This opens up new vistas for printers and as ever the importance of professional printers will be high. ♦

**Glossary**

**High Definition Skia Photography (HDSP)** is the name of the new, revolutionary printing process that delivers photo prints of unprecedented quality on conventional offset paper and reproduces even the finest textures and details. This new technology, which works directly from the negative -- the skiagraphic image -- produces photographs without the need for a darkroom.

**Simultaneous contrast** is the appearance of a light or object depending on what is around it. (Hue Depends on Background). Two colours, side by side, interact with one another and change our perception accordingly. The effect of this interaction is called simultaneous contrast. Since we rarely see colours in isolation, simultaneous contrast affects our sense of the colour that we see.

**Chevreul's theories** – ME Chevreul stated the Law of Simultaneous Contrast in this way, "In the case where the eye sees at the same time

two contiguous colours, they will appear as dissimilar as possible, both in their optical composition and in the height of their tone." Chevreul also identified three situations in which this contrast could be observed: **Simultaneous contrast** -- viewed between two colours placed side by side. **Successive contrast**, also known by the term 'negative afterimages.' **Mixed contrast**, where two colours are seen one immediately after the other such that the afterimage of the first is mixed with the second.