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The Effect of SpeedyDry When Added To Metallic Inks and Printed On Synthetic Substrates

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Please note!!

The following materials represent the senior class project of a group of students from Clemson University. While they are excellent students, they are not professional pressmen. They were working on an antiquated press they had *never* used before. Also, they were using inks and substrates that they had never before seen.

Title

The Effect of SpeedyDry When Added To Metallic Inks and Printed On Synthetic Substrates

Hypothesis

When mixed with the ink additive SpeedyDry, the metallic inks are expected to dry faster than the inks with no additives. Additionally, the drying times are expected to yield various results depending on the type of paper being used.

Problem

Previous studies have shown that the chemical SpeedyDry used to aid in the drying process of inks has reduced times drastically. The studies were performed on traditional types of printing paper and were not geared towards synthetic substrates; many of which require inks with certain drying capabilities (i.e. special oxidation or UV cured). Metallic inks were also not included in the original research. These inks typically require a longer drying time as well. The goal of this experiment was to determine whether these problems occurred when SpeedyDry was introduced as an ink additive.

Related Research

On July 1, 2004, results from tests with SpeedyDry were recorded from research conducted at GATF Research. GATF added 20% SpeedyDry to black, cyan and magenta and 12% SpeedyDry to yellow inks and tested their drying times on five different substrates. The drying times and cost analysis showed that SpeedyDry does in fact decrease drying times, revealing many economical benefits. Because the drying time is decreased, each job can be delivered to the customer in a more timely manner. This, in turn, increases customer satisfaction and will bring more business in the future. Once the job is dry it can be moved off the press room floor and into the next finishing operation. An increase in floor space is something that every printer can appreciate. Information on the SpeedyDry website indicates that drying times for inks with SpeedyDry on felt stocks and acidic stocks were about a quarter of the time needed for inks without the additive. Refer to Appendix A for these results.

Procedure

A two color file layout including halftones, solids, duotones, text and smear test targets was designed and output to film on the AGFA Avantra 25XT. The film was stripped and two 20" x 22 5/8", .008" thick V360 Kodak Polychrome Graphics offset plates were made. These plates, which were grained, anodized and negative working, were chosen because they are designed for commercial web and sheet fed processes. They are recommended for runs up to 360,000 impressions, more than enough to run all the samples in the experiment.

The test was run on the Miehle, a two-color, sheet-fed offset lithography press. Prior to the actual press run, the blanket material and form roller covers were replaced to ensure accuracy and consistency. The impression cylinders and plate cylinders were thoroughly cleaned in order to avoid contamination of the ink. The pressroom was set at a humidity of 46% and 73° Fahrenheit.

Two metallic inks, Reflex Blue and PMS 873 Olympic Rich Pale Gold, were donated by The Braden Sutphin Ink Company. Six substrates, Curious Touch, Curious Metallic, Virtual White, Glama Natural Opaline, Bindakote Navy, and Splendorlux Champaign Pearl were donated by Athens Paper. A seventh substrate, a book paper used at Clemson University, was used as a standard and was run at the beginning and end of both runs to ensure proper results throughout the run and also to help get the job in register before running the other substrates through the press. The table below shows the order in which each of the substrates was through the press.

Press Run A: Metallic Inks – No SpeedyDry	**Press Run B: Metallic Inks – SpeedyDry**
1. Sample stock – 440 book paper	9. Sample stock – 440 book paper
2. Curious Touch	10. Curious Touch
3. Curious Metallic	11. Curious Metallic
4. Virtual White	12. Virtual White
5. Glama Natural Opaline	13. Glama Natural Opaline
6. Bindakote Navy	14. Bindakote Navy
7. Splendorlux Champaign Pearl	15. Splendorlux Champaign Pearl
8. Sample stock – 440 book paper	16. Sample stock – 440 book paper

For Press Run A, metallic inks with no SpeedyDry were used. Half of each substrate was run through the press. As soon as sheets with solid densities began printing, four samples of each substrate were pulled and preliminary smear tests were conducted. The smear test was chosen as a way of testing the setting time of each of the inks on the substrates. Smear tests were performed on each substrate every 15 minutes until the sheet dried, with the exception of Curious Touch, Bindakote Navy, and Splendorlux Champaign Pearl. These substrates each showed little differences in the smear test after 15 minutes, so they were tested every 30 minutes instead. At the end of the first press run, the standard sample stock was run.

The ink was removed from the ink trays and properly disposed of. The SpeedyDry was then mixed with the metallic inks at a concentration of 15%. The mixture was put into the ink trays and given time to work into the inking system so that the ink on the sheets would have the additive in it. To aid in this transfer, the standard sheet was run through. For Press Run B, the

remaining half of each of the substrates was run through and samples were again pulled as they were in Press Run A. The press run was concluded with a final run-through of the standard stock in order to maintain consistency.

Results

After analyzing both the substrates printed with SpeedyDry as well as the substrates printed without SpeedyDry, it was shown that SpeedyDry is an effective ink additive for a majority of the substrates involved in this research project. With the Curious Soft and Glama Opaline substrates, the setting time was drastically reduced. Samples of these substrates that were printed without SpeedyDry took over 24 hours to dry; with the SpeedyDry these samples dried in less than two hours. Bottles of SpeedyDry claim to improve setting time by up to 75 percent. In some cases the improvements were in fact much greater. For quantified data refer to Appendix B.

Conclusion

Due to time constraints, this study made several assumptions about printing with SpeedyDry and synthetic substrates. Various factors that could make a significant impact on the results could be further tested at a later date. Some of the issues these are as follows:

1. Using different concentrations of SpeedyDry in the ink. It is possible that a higher concentration of SpeedyDry will yield significant results.
2. Only two types of metallic inks from one manufacturer were tested. It was assumed that inks from other manufacturers will react in a similar manner.
3. Six different synthetic substrates were tested. The assumption is that all synthetic substrates will react the same way.
4. Printing was done on the Miehle, a press not typically used in today's industry. It was assumed that the research would be valid for the technologically advanced presses that are in use today.
5. The biggest assumption was that the Miehle would be able to handle every substrate that was used. This experiment pushed the press to new limits and keeping everything in perfect working order was crucial.

Suggestions for Future Research

There are many ways in which this research could be expanded upon. Because of logistic issues in getting the substrates to Clemson, the Kromekote foil substrates were unable to be tested. Because it is a foil lined paper it presents different issues than those substrates that were tested. On the Navy substrate the reflex blue ink appeared as a varnish. Using a contrasting color ink, such as green, would have provided more conclusive results. This experiment utilized the Miehle because it was the only press available. Technology has developed presses that allow for more accurate control of ink, impression, and feed and can produce more accurate and reliable data.

Appendix A

SpeedyDry Concentration	No Drier	15%	20%	25%	45%
Ounces per Pound of Ink		2.4	3.2	4	7.2
Felt Stock					
Nekossa Feltweave	24	6	4.5	4	1.5
Fox River Teton	24	6	4.5	4	1.5
Fox River Sundance	30	4.5	4	3.5	1.5
Fox River Gainsborough	24	5	4.5	4	1.5
Fraser Passort	30	6	4.5	4	1.5
Category Average	26.4	5.5	4.4	3.9	1.5
Acidic Stocks (uncoated side)					
Beckett Cambric	26	4	3.5	3	3
Domtar Cornwall C1S	24+	4	3.5	3	3
Neenah Classic Crest	24+	4	3.5	3	3
Neenah Classic Laid	24+	4	3.5	3	3
Neenah Classic Linen	24+	4	3.5	3	3
Spinghill C1S Cover	24	3			
Uncoated 80# Business Card	24	4			
Wausau	24	4			
Category Average	24	3.9	3.5	3	3
Coated Stocks (coated side)					
Clay Coated Book Wt – neutral	0.5	0.25			
Clay Coated Book Wt – acidic	4	1			

Appendix B

The results from the press test can be shown below. A significant decrease in drying time was noticed when using the SpeedyDry additive. In the results below, a record of "inconclusive" indicates that the sample still smears after a week.

Metallic Gold Ink Drying Times (hours)

Substrate	No SpeedyDry	15% SpeedyDry
Curious SoftTouch	inconclusive	1.75
Curious Metallic	3	0.75
Glama Opaline	by 36 hours later	1.25
Virtual White	4.5	0.5
Champaign	inconclusive	by 36 hours later
Navy	inconclusive	by 36 hours later

Reflex Blue Ink Drying Times (hours)

Substrate	No SpeedyDry	15% SpeedyDry
Curious SoftTouch	inconclusive	4.00
Curious Metallic	6	2.25
Glama Opaline	7.75	2.25
Virtual White	5.5	3.25
Champaign	inconclusive	by 36 hours later
Navy	inconclusive	by 36 hours later