

Press release - for immediate publication

TroFilms publishes study about lamination of digital prints

Georgensgmünd, 06 May 2020 – Digital printing techniques are too different in terms of their characteristics (e.g. surface tension). For this reason, TroFilms GmbH, a medium-sized and globally operating specialist for high-quality special lamination films for the graphics and industrial lamination industry, located in Georgensgmünd in central Franconia, Germany, together with project manager Torsten Uhlig from Torsten Uhlig Solutions, Porta Westfalica, Germany, have initiated a comprehensive study to be able to make concrete statements on which film types are best suited for which digital printing process.

For this purpose, print samples were created in five distinct digital printing techniques on the basis of a coloured test forme with different surface coverings, which were then laminated with six selected thermal foils.

The film types were three qualities from the TroProtect series (scratch-resistant matt films) and three qualities from the TroTemptation series (scratch-resistant soft matt film), all from TroFilms.

The printed sheets laminated in this way were then analysed using various laboratory test series. All the sheets were then tested under the same conditions using folding tests, embossing tests and tests to determine the compound adhesion.

One and the same paper was used, namely the substrate LuxoArt 150 g/m² from Papyrus.

The sheets were printed in the processes:

- **Dry toner:** Here the toner particles are transferred from the photoconductor drum to the substrate and lie "loose" on the substrate. Only through the fusing roller (heat) are they fused with the substrate. The toner particles have a size of D50 = 8 µm. From 5 - 13 µm particle size can therefore be called relatively large particles.
- **Liquid toner:** Here the toner particles are first dispersed in liquid. They are transferred indirectly to the substrate via a blanket cylinder ("offset printing" principle). Otherwise, the functional principle is largely similar to the dry toner process. The toner particle size is D50 = 2 µm.

- **Inkjet - water-based / direct:** The ink is applied directly to the substrate. Water-based inks have a tendency to penetrate, so this process often requires a primer or ink-receiving layer to be applied to the substrate.
- **Inkjet - water-based / indirect:** The ink is first applied to a rubber blanket. From the rubber blanket the print image is transferred to the substrate, similar to the principle of "offset printing". No primers or ink-receiving layers are necessary with this process.
- **Inkjet - UV-based / direct:** Similar to water-based direct inkjet printing, the ink is also applied directly to the substrate in UV inkjet. Since UV systems are cured directly and contain a higher proportion of solids, the ink droplet does not penetrate or run, i.e. primers and ink receptor layers are not necessary. Polymerisation takes place immediately.

TroFilms selected six different films for the test:

- **TroProtect Thermal**
- **TroProtect-X Thermal**
- **TroProtect-X Digital** (other adhesive, all acrylic coated)
- **TroTemptation Thermal** (polyurethane coated, with soft matt surface)
- **TroTemptation-X Thermal** (also soft matt surface, but acrylic-based)
- **TroTemptation-X Digital**

The lamination was carried out on a TPM Katana 76, temperature 113 °C, with a pressure setting identical for all test series. Scope: 5 digital printing technologies x 6 thermal foil types = 30 results.

The lamination was carried out with the support of the company PrintLack in Schwadernau (CH).

Involved in the tests projected by Torsten Uhlig were three printers for the production of the five different digital print versions: Straub Druck (Schramberg) for the processes dry toner (Xerox Iridesse), liquid toner (HP Indigo 12 000) and water-based inkjet (Fujifilm Jetpress 750), Birkhäuser (CH-Reinach) for water-based inkjet (indirect, Landa S10) and Weidmann (Hamburg) for UV inkjet (Komori Impremia IS29).

The folding tests were performed by manual creasing on a Creaser Perforator GPM 315 and the results were evaluated after multiple mechanical stressing of the creasing by folding (10 to 15 times). Then it was checked whether and if so, where the film begins to lift off. An important

conclusion was: *"A lower ink coverage in digital printing is often accompanied by a lower delamination tendency in lamination. This means that with high ink coverage the film delaminates earlier than in areas with low or no ink coverage, according to the test results,"* says Ralf Troyer.

When looking through the results, it became clear: The adhesion values in UV inkjet are all problem-free (even with high ink coverage), the same applies to water-based indirect inkjet printing. The Landa system (water-based indirect inkjet printing) was also *"problem-free"* in terms of adhesion values. With liquid toner, one can clearly see that the digital versions of the films, i.e. the copolymer films, work worse here than the standard thermal films. According to Ralf Troyer this is also an interesting finding: *"If you work with liquid toner, a digital film only makes sense in very rare cases."*

The tests for embossability (carried out by WEILBURGER Graphics) were carried out with the embossing device G.L. Instruments, at 6.2 bar pressure for 5 s, whereby embossing test 1 was carried out at room temperature and embossing test 2 when heated to 40 °C.

However, it was found that, overall, fewer problems occurred during embossing than during folding and grooving. The tests showed that the acrylic-coated film is much more flexible in application than polyurethane-coated films.

The compound adhesion values were tested in accordance with DIN 53357, which is no longer valid. Since there is currently no other meaningful test method, the compound adhesion values were determined using this method.

A universal testing machine 500N Zwicki (Z 0.5), pull-off angle 180°, value N/15 mm test strip width, served as the testing device.

The compound adhesion values were determined (also with support from WEILBURGER Graphics GmbH):

- on areas with low ink coverage
- on areas with high ink coverage
- always at the identical positions of the print motif, for all test samples, in order to achieve direct comparability

The measurement was carried out four times (to compensate for any errors), the average value was entered in the table. The evaluation showed that the limit for delamination is approx. 2 N/15 mm (test strip width, see above). According to WEILBURGER Graphics, this value has been available for years as an empirical value.

The rule of thumb is: The higher the value determined, the more reliable is the further processing!

Testing with the dry toner was carried out with the lowest possible use of fixing oil *"In electrophotographic digital printing, where fixing oils containing silicone are used in some cases, adhesion problems can occur due to any silicone oils contained in the printing ink. Therefore, wet film lamination on digital toners and inks is not possible,"* says Torsten Uhlig.

"Digital prints are refined in the thermal lamination process. Consequently, only thermal foils were used for this test series", continues Ralf Troyer.

This series of tests confirms the complexity of the topic *"finishing of digital prints"* mentioned at the beginning. The thermal lamination properties showed clear differences. Toner processes, in particular dry toner, are to be considered much more critical than inkjet processes. The test forme was designed to create the hardest possible test criteria, which are not necessarily commonplace in practice. High ink coverage was the central criterion for adhesion problems in the dry toner process, i.e. with lower ink coverage, lamination was possible without complaint.

Ralf Troyer comments: *"Our aim was to base this series of tests as closely as possible on real requirements and difficult productions in order to obtain meaningful, resilient and of course*

repeatable results for us, our trade partners and our customers. The results of the study will henceforth facilitate the correct selection of suitable films for different digital printing processes. Therefore, we also make the results of our tests available for free use".

The knowledge about this can protect the user from unpleasant surprises in individual cases.

Ralf Troyer concludes: *"Due to the advance of digital printing and the variety of technical solutions on the market, we saw it as a necessity and duty to test and evaluate film lamination for as many digital printing systems and technologies as possible under laboratory conditions. The results of this study are naturally also incorporated into our product development and help us to continue to meet the needs of our customers in the future."*

The study is available immediately on the Trofilms GmbH website. The company is also happy to answer any questions about the test results or specific applications.

Furthermore, this study was also presented in Deutscher Drucker, issue 07/2020.

Further information is available at www.trofilms.de

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Caption:

Ralf Troyer, managing director of TroFilms GmbH and Torsten Uhlig, owner Torsten Uhlig Solutions, who were responsible for the initiation and realization of the study



Caption:

Ralf Troyer, managing director of TroFilms GmbH at the official presentation of the study results with all participating companies as well as Mr. Frank Lohmann, from the magazine Deutscher Drucker



Caption:

TroFilms GmbH headquarters in Georgensgmünd - since July 2019 certified according to DIN EN ISO 9001:2015



Caption:

Ralf Troyer, Managing Director of TroFilms GmbH

About TroFilms GmbH:

The medium-sized TroFilms GmbH, which is based in Georgensgmünd in Germany, is established as a renowned and innovative manufacturer of laminating films for the graphic arts and industrial lamination industry. The company currently sells its products in 28 countries and has a well-developed dealer and sales network worldwide. The successful development of the company earned it several prestigious awards. Among other things, the Founder's Award as the best "Start UP" company, which is awarded by the Sparkasse in Middle Franconia, and the Founder's Award by the Chamber of Commerce and Industry. In 2014, TroFilms GmbH was also nominated for the German Founder Award. TroFilms does not compete with any of its customers, since it does not process any goods itself.

www.trofilms.de