A SURVEY AND INTERVIEW REPORT - EXECUTIVE SUMMARY

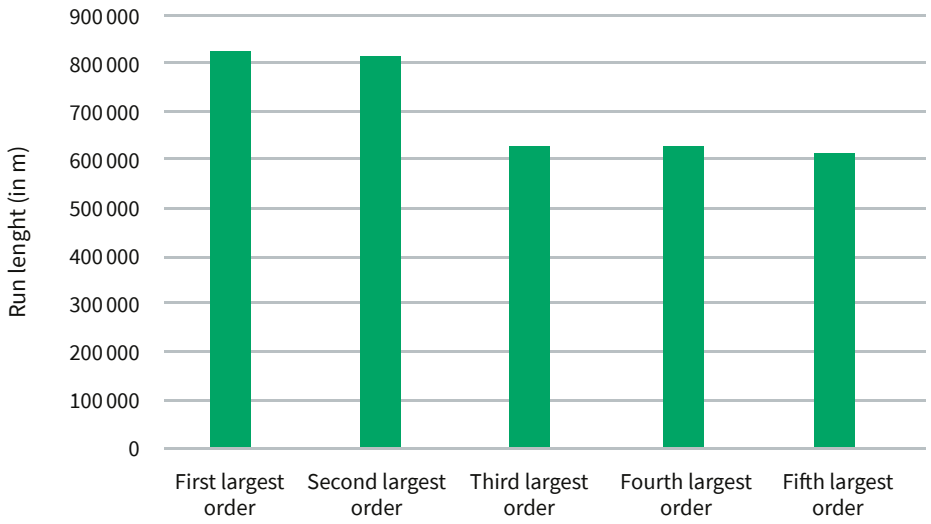
Gravure Printing and Sustainability

by Kilian Menzel, Natalie Früholz, Lucia Görbert, Lutz Engisch,
Leipzig University of Applied Sciences (HTWK), Institute for Printing, Processing and Packaging Leipzig (iP^{3}Leipzig).

Gravure printing offers great potential for the circular economy: its major ecological advantages are the reusability of the print forme (base cylinder) and closed material cycles which enhances the sustainability of the gravure process. Generally the ecological impact of the various printing processes depends on many different factors and require a case-by-case consideration for every application and print job. Current innovations of the gravure process aim to further improve its sustainability (e.g. by developing alternatives to the use of Cr^{VI}).

This study is based on a questionnaire and semi-structured interviews. The online questionnaire was conducted from 14. Feb 2022 to 1. Jun 2022 and addressed more than 116 contact persons. It includes questions to all life stages of the rotogravure printing workflow and includes upstream and downstream processes, e.g., cylinder engraving and transportation as well as recycling and deinking. Based on the defined role in the gravure printing industry, the survey contains a certain selection of questions, which are specifically addressed to these stakeholders. Survey respondents are very concerned with sustainability, with **43 % indicating very familiar and 48 % indicating moderately familiar** with the issue of ecological sustainability within the gravure printing industry.

WHAT WERE THE 5 LARGEST RUN LENGTHS PER IMAGED GRAVURE PRINTING FORM ORDERED IN 2019? (IN M)



The analysis of the largest orders showed that **run lengths up to 800.000 meters** still exist. Mono **film material with a thickness below 25 µm** is the most frequently used substrate.

The **reusability of the base cylinder** is perceived as the **strongest advantage of gravure printing**. Further strong improvements concerning the sustainability of the process were seen in the use of and the **reduction of emissions of hazardous chemicals**. Within the respondents, the electrolysis process of chromium trioxide (CrVI) is perceived as the strongest challenge for gravure printing.

Approaches for further improving the sustainability in the future were seen in recovering solvent, using lower ink film to save ink, the substitution of Cr^{VI} and reducing make-ready waste (e.g., through automation).

Above all, the interviews revealed a desire for **better communication and coordination throughout the entire supply chain**. This includes all players from ink manufacturers, machine builders, design agencies to recycling companies. This exchange could facilitate the coordination and prioritization of developments to sustainably improve environmental factors.

In addition to the online questionnaire and the semi-structured interviews **very first approaches for a life cycle assessment** were carried out. In this context, the first challenges and limits could already be identified: General statements are not possible. Due to the wide range of parameters, a general or holistic (LCA) comparison of different printing techniques would be very difficult to perform. **Product-dependent case-by-case decisions, supported by comparative LCAs, could help in the future to choose the most environmentally friendly printing process.**

Authors:
Prof. Dr. rer. nat. Lutz Engisch: Director of iP³ Leipzig –
Institute for Printing, Processing and Packaging Leipzig,
Professor of the Department of Materials and Materials Testing.

M.Eng. Kilian Menzel: Master of Engineering in Printing and Packaging Technology,
Research Assistant in the Department of Materials and Materials Testing.

B.Eng. Natalie Früholz and B.Eng. Lucia Görbert:
Master students at HTWK Leipzig.

Hochschule für Technik, Wirtschaft und Kultur Leipzig,
University of Applied Sciences
Karl-Liebknecht-Straße 132, 04277 Leipzig

iP³ Leipzig
Institute for Printing, Processing and Packaging Leipzig

I-HTWK Hochschule für Technik, Wirtschaft und Kultur Leipzig