

Functional Inkjet Printing

Digital printing as an industrial production process

Inkjet printing unit with four Fujifilm Dimatix QS-256 print heads including control electronics for fluids and print heads.

Piezo inkjet printing as an industrial production process

Inkjet printing is one of the most popular methods of digital printing. It is mostly used to decorate paper and paper-like materials, and everyone knows the technology from printers at home or in the office. Digital printing technologies have become indispensable in many areas: from business letters and online photo printing right up to large-format posters.

Potential

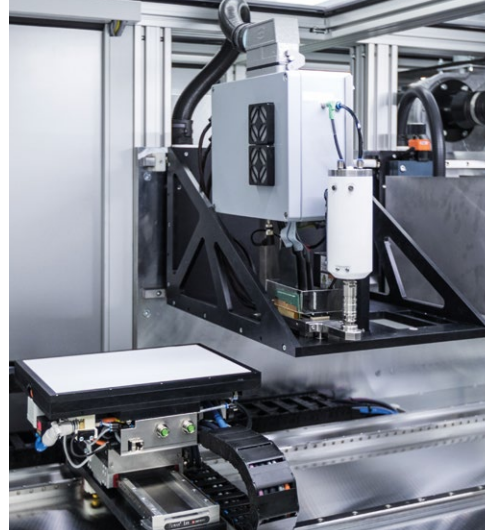
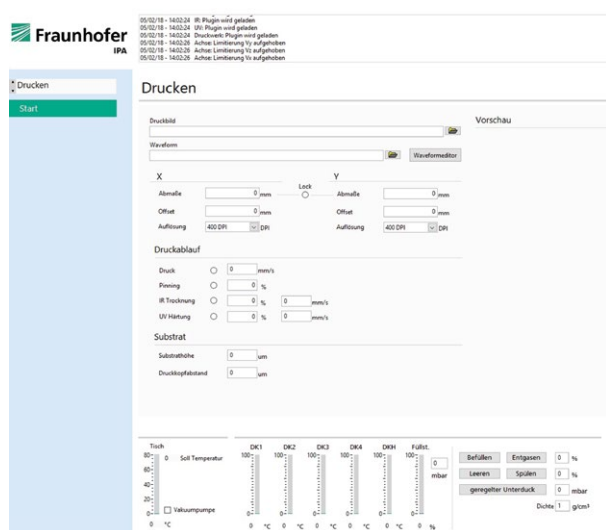
However, this technology opens up many more possibilities than just these. Apart from decorative applications on paper, it can also be implemented as a productive industrial production process. The flexible technology is still relatively uncommon in this field despite the fact that it can be used for a wide range of applications. For instance, screen printing processes can be replaced or conductive layers generated individually.

Likewise, biomedical applications are also conceivable, with the advantage that sharp-edged selective layers can be applied in a contact-free process with hardly any production waste. This is done mask-free and highly efficiently directly from the digital dataset, which is especially important within increasing digitization and flexibility.

A wide range of materials can be processed: UV-crosslinking substances can be used as well as solvent- and water-based materials.

Inkjet test rig for ink characterization including a drop-watching system.





Development and implementation of control hardware and software for 2D and 3D inkjet printing test benches.

2D inkjet printing test bench including vacuum table and curing mechanism (UV, IR).

Challenges

In contrast to other application methods however, materials must be of low viscosity and the solids content and particle size cannot be increased arbitrarily.

To take advantage of the digital printing technologies, it is rarely possible to replace existing processes and materials 1:1. New concepts also need to be developed for pre- and post-processing steps. The print heads and systems on the market are mostly used for decorative applications on paperlike substrates, with the result that a standardized solution for industrial applications is rarely available.

Determination of material properties e.g. surface tension.

Services

In order to meet these challenges we have been working together with our partners and customers for many years: Our services range from feasibility studies through integrated process development up to the construction of suitable printing units, process equipment and complete test benches and pilot plants. In cooperation with partner companies, we also realize production-capable systems.

Our services at a glance:

- Feasibility studies
- Processing tests and support with material adaptation and development
- Process development related to the printing process itself as well as for pre- and post-processing steps
- Help with selecting the right technologies
- Design and construction of process equipment, test benches and systems

Application examples

- Functional and/or structured surfaces
- Printing on structured and shaped substrates
- Printing conductive structures

Contact

Jan Janhsen M.Eng.
Phone +49 711 970-1144
jan.christoph.janhsen@ipa.fraunhofer.de

Laura Cirstea B.Eng.
Phone +49 711 970-3517
laura.cirstea@ipa.fraunhofer.de

Fraunhofer Institute for Manufacturing Engineering and Automation IPA
Nobelstrasse 12, 70569 Stuttgart, Germany
www.ipa.fraunhofer.de/en