

Printing Technologies for Flexible Electronics

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“A view of a small Swiss mechanical engineering company into the market for printed electronics.”

Brief Profile

- Wood-based panel industry and graphic arts industry
 - Worldwide, 98% exports
 - 12,000 m² production area
 - € 45 million turnover
 - 150 employees, including 30 trainees

Factorys based in St. Gallen – Switzerland and Shanghai
– China.



Varnishing

HIBIS 104



Laminating

SYRIUS W/T



COLIBRI



LOTUS SF



Graphic

HIBIS 104 UV Screen- / Flexo printing machine

The most productive screen printing machine. Print length and register correction during the run. With modifications, this technology could provide a good basis for applications in printed electronics.

Stacker
Sheet profiling system
Sheet break

UV dryer
with cooling

IR dryer

Rotary
Screen-
and Flexo
printing unit

Touch Panel
Sheet alignment
Swing-arm
Side lay with
electronic control

Stacker

Ionized air
Height 1450mm

Hot-air-dryer
1m extended flow-out

Calender with built-in
vacuum dust extraction

Ionized air
Pre-piling



Standard
Options

Graphic

SYRIUS W

Lamination

Stacker
Sheet break
Sheet profiling

SUPER HOT KNIFE
for all film types

Lamination unit with
2 heatable rollers
Film slitter & rewinding
Gluing unit

Feeder
Sheet alignment
Side-lay

Height 1'450mm
Ionized air

Cooling roller
Display s/h

Hologram-Plus

Calender Height 1'450mm
Ionized air
Double sheet control
Pre-piling

Basis for the future project "Register true lamination". Start of development planned in early 2011.



Standard
Options

Not „reel to reel“, but „sheet to sheet“

- Steinemann is clearly focused on the sheet to sheet processing.
- We see clear advantages in the batch – process:

Processing and treatment of printed layer can be perfectly adapted to the needs of each process step. Between each process step printed layers can perfectly dry before the next process step follows.

The sheet processing allows a high substrate flexibility. Various materials and material thicknesses can be processed.

Requirements for the registration accuracy ?

With near series production machines transistors will never be printed, with their extreme demands on register accuracy. But we see outside of this application a wide range of applications that are of interest:

- printed sensors
- printed large area displays
- lighting applications
- security applications

etc.

Focus on large area electronics

The question: to be a pioneer or a follower?

Besides the advantages to be a pioneer, there are especially for a Swiss SME many disadvantages:

- market and technological uncertainties
- unforeseen changes in technology
- incumbent inertia:
 - It is used the procedure that is known from the lab e.g. Inkjet
- House development of production equipment by the manufacturer of printed electronics. Manufacturing process as part of a strategy to secure market advantages (e.g. PolyIC).
- Strong customer demand for exclusivity. Thus no economies of scale can be achieved.
- Hardly any public support to cover the market uncertainties.

Germany: cluster formation with strong public support

Engineering may be limited in the field of printed electronics not only to the supply of technical production equipment. A certain product and process development and understanding is imperative.

Heidelberg (and gallus) are part of the german Excellence Cluster "Printed electronics forum". Basic research and associated machinery development to be promoted very strongly.

From my own experience at manroland (my former employer), I can also report a very strong public support. We were able to recruit as physicists who have investigated such questions of quality of printed features.

The solution for us

We have to identify technology areas that are also interesting to other, more mature industrial markets. This is the only way to justify his high development costs. A pure focus on the printed electronics development would be not responsible due to of the high risks for a small company like ours.

we identified the following areas in which we want to establish ourselves in the future:

- improved rotary screen printing process on sheet material
- register-laminating of printed films on sheet material
- High-performance format width inkjet printing
(precise and highly accurate sheet transport by Steinemann, inkjet delivered by partner, printing width up to 1m)

Register - Laminating

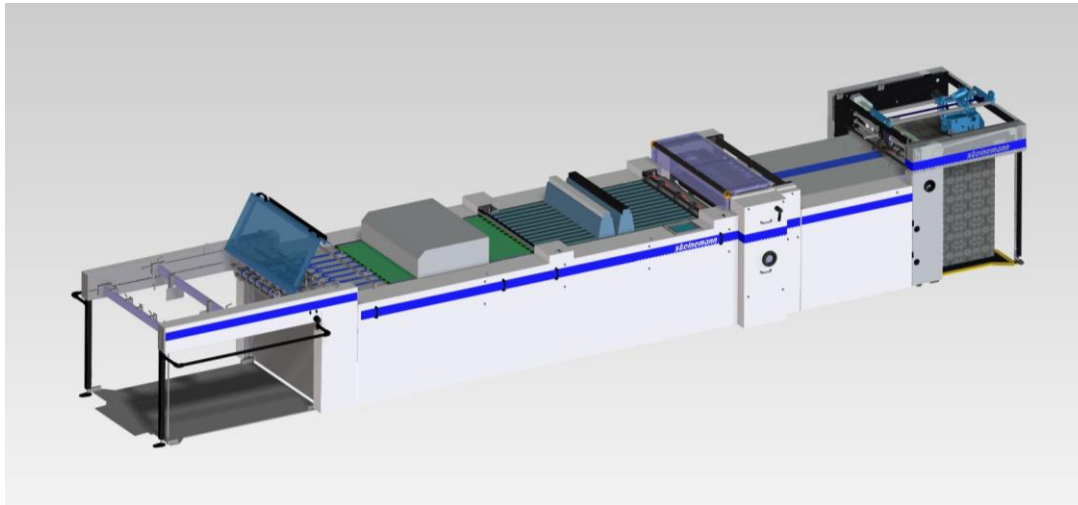
There is a need for the following industries: glass industry, metal industry (decoration of metal plates). This markets we will address first.

The original impetus for the development of this technology came from the field of printed electronics.

This technology could also allow for multi-layer applications for mass production. Each functional layer can be individually printed on roll stock and then connected to a multi-layer. Problems with the topography of printed layers and the adhesion of different materials can be avoided. The procedure will be very highly productive (60m/min target).

High performance format width inkjet

- staggered inkjet heads up to a width of 1m
(inkjet delivered and developed by a partner)
- high accurate flat sheet transport developed by Steinemann
- Printing solutions 600 resp. 1200dpi by 75m/min
- There is a big demand in security printing and in the packaging industry
- Precise sheet transport can be also used for applications in printing electronics



Partnership

Outside of our own product range, we can think of partnerships with companies who require a highly accurate sheet transport.

Steinemann can bring modern sheet transportation systems - from the feeder to Stacker - in a partnership.

We are an open and cooperative acting company. Do not be afraid to discuss your vision and ideas with us.

Graphic

Thank you for your kind attention.
Please do not hesitate to contact me.

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